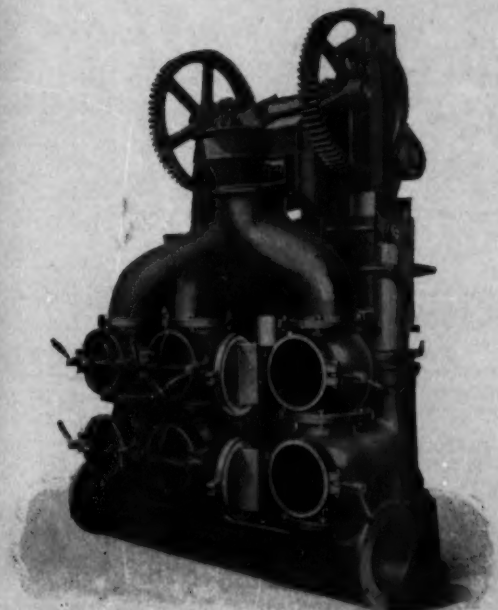
APR 23 1928

# PAPER TRADE JOURNAL

Vol. LXXXVI, No. 16 APRIL 19, 1928 United States, Per Annum, $4.00 Canada and Foreign Countries in Postal Union, $6.00


# BELOIT PUMPS FOR SERVICE



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**Chicago, U. S. A.**

**Canadian Barking Drum Company, Ltd., Toronto, Canada**


Entered as second class matter August 13, 1925, at the Post Office at East Stroudsburg, Pa., under Act of Congress of March 3, 1879. ESTABLISHED 1872 FIFTY-SIXTH YEAR Published every Thursday by the Lockwood Trade Journal Co., at 34 N. Crystal St., E. Stroudsburg, Pa.
EXECUTIVE AND EDITORIAL OFFICES: 10 East 39th STREET, NEW YORK CITY. CHICAGO, 123 West Madison Street, Chicago, Ill.

# PAPER TRADE JOURNAL

ESTABLISHED 1872

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

FIFTY-SIXTH YEAR

Published Every Thursday by the

LOCKWOOD TRADE JOURNAL CO., Inc.

GEO. S. MACDONALD, President — F. K. HOPPIE, Secretary

Executive and Editorial Offices, 10 East 39th Street, New York
Chicago Office: Room 14, Suite 410, 123 West Madison St.


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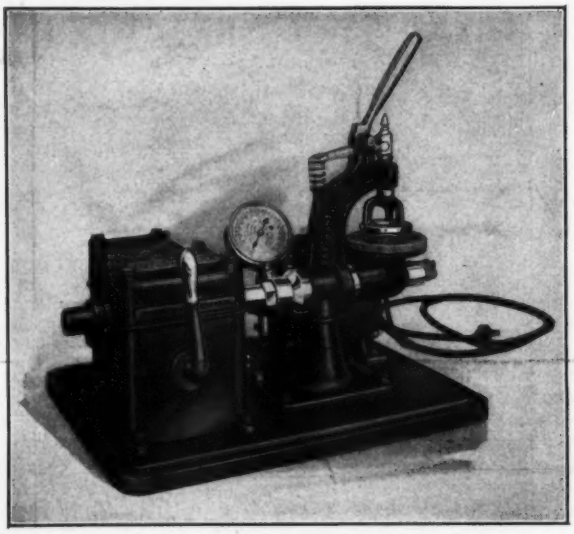

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With Which Is Combined

Vol. LXXXVI, No. 16 — PAPER — Thursday, April 19, 1928

# Hold Pulp and Paper Symposium at Portland

## Representative Pulp and Paper Men, Chemical Engineers and Foresters Discuss Problems Confronting the Paper Industry in the Pacific Northwest at Regional Meeting of the American Chemical Society—Vance C. Edwards, Manager of Northwest Pulp and Paper Co. and Dr. Benson Speak

[FROM OUR REGULAR CORRESPONDENT]

PORTLAND, Ore.—The Pulp and Paper Symposium was one of the most important sessions of the Pacific Northwest Regional Meeting of the American Chemical Society held at Red College, Portland, April 7.

### Vance Edwards Reads Paper by Mr. McBain

Vance C. Edwards, mill manager for the proposed plant of the Northwest Pulp and Paper Company at Astoria, Ore., read the paper prepared by B. T. McBain, who was unable to be present because of a business tour in the east.

Dr. H. K. Benson, head of the department of chemical engineering at the University of Washington, Seattle, spoke on the co-operation of colleges and universities in relation to the pulp and paper industry, and referred to the research work now being done. "Every problem," he said, "in the pulp mill has its counterpart in the underlying fundamentals of the laboratory, and the adaptability of the latter to aid in the solution of the former is evident from the illustration where a tiny radio set governs and controls the massive paper machines which are always so attractive to the layman visiting a paper mill."

### Dr. Benson Offers Use of Laboratories

Dr. Benson offered his laboratories for research work in the pulp and paper field, and suggested that a department in the northwest technical society devoted to consideration of specialized pulp and paper problems might be a great aid to advancement along lines of the industry. These meetings could then be participated in by university experts and practical pulp and paper men, and much good would result, thinks Dr. Benson.

### Suitability of Pacific Coast Pulpwood

W. H. Gibbons of the United States Forest Service, Portland, chairman of this section of the program, spoke on the "Volume and Suitability of Pacific Coast Pulpwoods." "The Pacific Coast possesses two chief factors necessary in pulp and paper manufacture," he said. "These are a large supply of suitable pulpwood and an abundance of available water power. To produce in the United States the pulp and paper now imported and probably in part at least to absorb pulpwood imports, it will be absolutely necessary to draw on Pacific coast pulpwood supplies. The Pacific coast will be the source of the permanent supplies of pulpwood."

### Waste Products for Paper Industry

Allen H. Hodgson, associate forester of the Portland office of the forest service, spoke on use possible in logging waste products for the pulp and paper industry. "There is no reason," he said, "why operations in stands containing a large percentage of pulp species should not be designed to obtain saw timber from the material most suitable for that purpose, and pulpwood from the remainder of the sand. There are great possibilities in the integration of the lumber and pulp industries, which would make entirely feasible large use of both logging and sawmill waste for pulp. If the pulp industry continues to develop practical means for making greater use of the sawmill and logging waste it will be doing a great deal toward helping itself as well as assisting to establish continuous prosperity in the Pacific northwest where the forests give employment to some 168,000 men in Oregon and Washington and pay nearly 65 per cent of the industrial payroll."

After the program about forty made a trip to St. Helens to visit the new plant of the St. Helens Pulp and Paper Company.

The regional meeting closed with a dinner given in honor of Dr. Robert E. Swain, head of the department of chemistry of Stanford university.

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## Claims Against State Filed by Paper Mills

GLENS FALLS, N. Y., April 16, 1928.—Claims against the state totalling $165,678 made by Glens Falls and vicinity corporations for temporary approporiation of water from the Hudson River for use in the barge canal will be heard by the Court of Claims at the term to convene at Albany April 9.

The Union Bag and Paper Corporation, of Hudson Falls, has filed a clam for $108,000 for appropriation of water and the International Paper Company, of Glens Falls, has presented a claim of $56,000 for the same cause. The Imperial Wall Paper Company, of Glens Falls, has a claim of $1,678 for the overflow of water.

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## Contracts for Mill Reported Signed

[FROM OUR REGULAR CORRESPONDENT]

PORTLAND, Ore., April 12, 1928.—Report from Astoria, Ore., is to the effect that officials of the Northwestern Pulp and Paper Company have announced contracts signed with the Austin Construction Company, of Cleveland, for a 100-ton pulp mill at Astoria.

The message came from B. T. McBain as manager of the Northwestern Company, who has been in New York for some weeks in the interest of this mill. Mr. McBain stated that he was leaving at once for the west, bringing the contracts with him.

# News Print Production Expanding in Canada

## March Output Totalled 197,976 Tons, An Increase of 23,882 Tons Over Corresponding Month Last Year—Ratio Of Shipments to Production Dropped Sharply In March—Swedish Competition May Have Important Bearing On General Situation

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 16, 1928.—"More satisfactory than had been expected, not so satisfactory as had been hoped." Such is the verdict on the figures of news print manufacture in Canada for the month of March. These figures showed a total production of 197,976 tons, an increase of 23,882 tons over last year. In the past month, however, the average daily capacity of the mills has increased to 9,137, as compared with 8,802 tons in the previous month, and the average production for March dropped to 80.3 percent of capacity, as compared with 86.2 percent of capacity in March, 1927, As the average production in United States mills for March, 1928, was even lower, being 79.7 percent of rated capital, it is evident that news print manufacturers still have something to worry about.

Furthermore, the ratio of shipments to production also showed a sharp drop last month. Shipments from Canadian mills during March amounted to 190,305 tons, or above 7,600 tons less than given production. These shipments left mill stocks on hand at 47,657 tons. A year ago the March shipments were 169,061 tons, leaving mill stocks of 28,462 tons. It will be seen from this that stocks on hand at the end of March last were approximately 19,000 tons greater than one year previously. In March the mills shipped 77.1 per cent of average production, whereas one year previously the percentage was 83.8. Shipments for the first three months of this year were 565,816 tons, as compared with shipments of 474,292 tons in the first quarter of last year. The February, 1928. shipments amounted to 188,163 tons.

For the first three months of 1928 production of news print in Canada reached 575,647 tons, as compared with 487,804 tons in the corresponding period of 1927, the increase in favor of the first quarter of 1928 being 87,843 tons.

Average operating rate of the Canadian mills for the first three months of 1928 was 84.5 per cent., whereas in the similar period of 1927 the mills operated 87.4 per cent of rated capacity.

### Swedish Competition

On the top of this, the spectre of Swedish competition is looming up again, with the settlement of the strike in the Swedish pulp mills. These mills, according to cable reports, are expected to be in full operation almost immediately, after being idle since January 2. Although the employees will get a 5 per cent increase in the lowest wages and 10 per cent increase in the highest wages, it is expected that the competition will have an important bearing on the general situation, though it is too early yet to estimate what the effect will be.

### High Prices for Paper Plants

Meanwhile, those who take a long view of the situation are by no means pessimistic, as is shown by the high prices paid for paper manufacturing concerns in connection with the recent mergers. The *Financial Post*, of Toronto, has given some interesting figures relative to these purchases.

Although some investors were surprised at the fact that the Bathurst Company recently changed hands at $110 a share, this price, it points out, compares favorably with several other similar deals. Since the Bathurst deal other pulp and paper properties have changed hands, the latest one being the St. Lawrence Paper Mills. As yet, of course, the St. Lawrence Paper deal has to be formally closed, but it is stated positively that the price will be $110 a share for each of the 50,000 common shares of no par value outstanding. Hence it is possible to make an interesting comparison of the prices of the properties of Bathurst, Howard Smith, Donnacona and St. Lawrence. In any such comparison, though, the value of contracts such as St. Lawrence now has for its output and the expansion plans of both St. Lawrence and Bathurst must be taken into consideration.

The following figures show the approximate price which has, or is to be paid for each of the properties. The price is obtained by adding the outstanding bonds and preferred shares to the total price paid for the common. The prices can only be approximate for in some instances the senior obligations have been redeemed at their call price. Net operating profits are the figures shown in 1926 as being applicable to depreciation, income tax, bond interest and other junior charges. The figures on timber and power holdings give a partial indication of the values back of each company. The comparison follows.

| Company | Approximate Price | Net Oper. Profits, 1926 | Timber | Power |
|---|---|---|---|---|
| Bathurst | $13,000,000 | $853,000 | 2,600 sq. m.<br>18,000,000 cords | 10,000 hp. dev.<br>40,000 hp. und. |
| Howard Smith | 11,600,000 | 855,000 | 500 sq. m. | ..... |
| Donnacona | 13,500,000 | 856,000 | 5,400,000 cords | 11,000 hp. dev.<br>35,000 hp. und. |
| St. Lawrence | 16,300,000 | 970,000 | *5,250,000 cords | ..... |

* 1926 figures since greatly augmented.

### Scottish Complain of Canadian Attitude

A Canadian Press cable despatch from Edinburgh: says "Scottish firms engaged in paper manufacture complain that there has been a large shrinkage in the quality of paper shipped from Glasgow to Canada since the war and the Chamber of Commerce here is directing a letter on the matter to the Dominion Minister of Finance, the Hon. J. A. Robb. Scottish firms engaged in the paper trade allege that arrangements are in force between the Canadian paper makers and the Canadian dealers under which the latter have undertaken not to make purchases of paper outside of the Dominion unless the kind wanted cannot be obtained in Canada.

"Many Scottish jobbers are said to regard this as in the nature of restraint of trade but hesitate to protest publicly for fear they might not be able to purchase Canadian paper when this is desired.

"It is pointed out that in the Dominion's tariff there is a preference for British made paper. Bearing this in mind, as well as the question of Canada's revenue, the Edinburgh Chamber of Commerce takes the ground that it is to the Dominion's disadvantage to exclude British paper to so great an extent through these internal arrangements."

As a commentary on the above, it is interesting to note that dealers and business houses in Canada are actively co-operating in the use of Canadian made paper wherever possible, and this movement is being greatly helped by the water-marking of the Canadian product, so that identification of the origin of paper used is readily made.

The largest producer of high grade paper in Canada, and a producer also of coated and half-tone news, is Provincial Paper, Ltd., whose various plants are reported to be operating at full capacity, with all indications pointing toward excellent earnings result during the current year, following the good showing made in the final eight months of 1927.

During the year 1927 the book and writing paper mills increased their output of fine papers from 57,752 tons in 1926 to 61,606 tons in 1927, or about 6 per cent. On the other hand the importations of book and fine papers, showed an increase of

some 20 per cent, being 7,910,113 lbs., as compared with 6,560,757 lbs. in 1926.

In this connection it may be interesting to recall that for the benefit of magazine publishers in Canada, the recent Canadian budget provided for an 80 per cent drawback on the duty on imported news print, machine-finished book grades of paper not coated, coated or supercalendered grades of paper, "when used exclusively in the production in Canada of magazines or periodicals, including farm journals, printed, published and issued at regular intervals, and enjoying second-class postal privileges, containing critical informative and descriptive articles on various subjects, current topics, political and other news or reviews, criticism or other informative matter, or fiction, being bound, wire stitched or otherwise fastened together."

A drawback of 99 per cent was also granted on woven fabric manufactured for covering the outside of books, of a class or kind not made in Canada "when imported by bookbinders for use exclusively in binding books in their own factories."

### Paper Making Record

A despatch from Port Arthur, Ont., says: "What is considered to have been a record run on a paper-making machine was made this week at a local mill. The machine started at 9 o'clock on Monday morning and until 11.40 last night (Wednesday) it did not stop nor had a break occurred in the paper. This establishes a high water mark of machine running at the head of the lakes. The paper as it left the machine was 209 inches wide. The run off was sufficient to fill twelve carloads, making a total of over 300 tons of news print."

### New Mill at Winnipeg

From Winnipeg it is announced that construction of a combination paper mill and box factory, the ultimate cost of which will be $1,000,000, will begin there this year. The mill is to be built by the Hinde and Dauch Paper of Canada, Ltd., and also of the United States. The plant will be a duplication of the straw plant at Trenton, Ont., but will also manufacture paper and corrugated boxes.

### An Aerial Survey Record

Without achieving spectacular flights Canadian airmen have nevertheless set up a world record in their own special line of aerial survey. Some 200,000 square miles of unexplored territory have been mapped in five years, which is equivalent to circling the world eight times with a mile-wide strip photographed.

## Safety Report in the Paper Industry

The following are outstanding facts in the annual report soon to be issued of the Paper and Pulp Section of the National Safety Council:—

1. 186 establishments reported for 1927—133 in 1926. Increase 40 per cent.
2. In 1927, 64,283 employees worked 185,369,903 man hours.
3. The 186 establishments are divided as follows: 52 Paper Goods Manufacturers; 134 Paper and Pulp Mills.
4. 1927 average frequency rate = 27.42. Average for 7 years previous equals 42.03. Reduction 35 per cent.
5. 1927 average severity rate = 1.57. Average for 7 years previous equals 2.36. Reduction 33 per cent.
6. 95 establishments, or 51 per cent of total, have frequency rate below 1927 average.
7. 152 establishments, or 82 per cent of total, have severity rate below 1927 average.
8. 1927 ratio, persons employed to lost time injuries 13 to 1. Days lost per injury = 57. Ratio for 7 years previous = 9 to 1, with 57 days lost per injury.
9. 1927 ratio, non-fatal to fatal injuries = 165 to 1. For 4 years previous 212 to 1.
10. 14 establishments completed 1927 without a lost time injury.

## Hon. John A. Dix Dead

John Alden Dix, who was Governor of New York State from 1910 to 1912, and was prominent as a lumber merchant, manufacturer and banker, died Monday of last week in the Harbor Hospital, 667 Madison Avenue, New York, of an attack of heart disease.

Governor Dix was born on Christmas Day, 1860, at Glens Falls, N. Y.

Mr. Dix attended the Glens Falls Academy and then entered Cornell. After graduating from the university in 1883 he first worked as a farm hand and as a mechanic in the machine shops of Glens Falls, to learn what labor means to the man at the bottom. He joined Lemon Thomson of Albany in the lumber business, and in 1889 married his partner's daughter, Gertrude Thomson. In the course of time he extended the lumber business into paper manufacturing at Thomson, Washington County, just south of the Adirondack region and within the forest zone. He acquired 17,000 acres of forest and for every tree he cut down he planted another.

He never lost his sympathy for the laborer, and stated that his ambition was to be "an employer of contented labor." When strike talk was in the air he met the committee of his workers and said that he would give the desired 10 per cent. increase if they increased the output the same amount. The terms were accepted and lived up to on both sides.

For some years before his election as Governor in 1910, Mr. Dix had been an important, though not a powerful, figure in State politics. He was Chairman of tthe State Democratic Committee, and two years earlier he had run for Lieutenant Governor. He was known rather as a business man of the highest standing, as a successful lumber merchant, paper manufacturer and banker, an ardent advocate of forest conservation, and as an employer who got on too well with his employees to care whether they belonged to a union or not.

In 1906 he had shown the courage of his convictions by bolting the Hearst ticket, and during his tenure of the State chairmanship he worked hard to bring about harmony in his party.

The chief business interests of Governor Dix were the Iroquois Pulp and Paper Company of Thomson and the Moose River Lumber Company of McKeever, of both of which he had been President. He had also held the Vice Presidency of the First National Bank of Albany, and had been a director of the Albany Trust Company, Glens Falls Trust Company and Standard Wall Paper Company of Hudson Falls, Treasurer of the American Wood Board Company of Thomson, and a member of Reynolds & Dix, manufacturers of black marble.

## Body of Missing Paper Mill Engineer Found

CARTHAGE, N. Y., April 16, 1928.—The body of Arthur E. Lester, chief engineer at the plant of the Carthage Pulp and Board Company, Inc., who mysteriously disappeared from the mill about three months ago, was taken from the Black River early this week thus ending a search which has continued since his disappearance. Mr. Lester has been superintendent of power at the Carthage mill for about a year. Early in January he suddenly disappeared and many theories were advanced, it being felt by some that he was a victim of amnesia and had wandered away from the mill. Others felt that he had been drowned and the Carthage mill was closed down for three days following his disappearance while a thorough search was made of the river in the vicinity of the mill. A reward of $200 was offered for the finding of the body, half of this being contributed by employees of the mill and half by officials of the company. This reward was withdrawn March 1.

Mr. Lester was born in Moravia in 1882 and since leaving school he has been associated with paper mills in Northern New York, having held positions with many of the leading mills during the past twenty-five years. Before coming to the Carthage mill as chief engineer he was with the Diana Paper Company, at Harrisville. The survivors include his wife and one daughter.

# Demand for Paper Moderate in Philadelphia

## Pennsylvania Paper Manufacturers Report Orders Slightly In Excess of Corresponding Period Last Year—Request For Fine Papers Less Active Than a Fortnight Ago—Club Car Deliveries of Kraft Papers Freely Patronized by Local Distributors

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., April 16, 1928.—In the main, the Philadelphia paper trade drifted along in a post holiday market that was not encouraging for the continuance of a springtime upswing of business. While the distributors experiencing a fair demand were in the minority, the mills reporting on operations stated that though far from normal seasonal requirements, orders were slightly in excess of April of last year. Local mills have been more or less operating on curtailed schedule with from 75 to 90 per cent of capacity the prevailing working record. April orders have been slackened but this may have been due to the holidays when heads of firms are engaged in vacation pursuits allowing business affairs to be postponed until the Easter resting days are over.

While the demand for fine papers is more generalized there has been a narrow market ever since the Easter holidays set in. A few seasonal specialties have been in demand but the staple lines are now less active than they were a fortnight ago. With the advent of the Commencement season there has been increased shipments of social stationery needs in announcements, diploma stocks and writings of the better grades as well as covers consumed by this class of trade. Engravers supplies have been slightly more active and a few of the lines used by manufacturing stationers now preparing for the mid year recording of business. Book papers, except for the wholesale contracts, are easing into the hand to mouth type of market that now dominates the general distribution situation. A few lines consumed by the advertising trades for summer announcements have become more active as the mercantile trades prepare for hot weather. High grade papers used by financial institutions for engraved certificates or stocks of like character have been among the grades that were fairly lively in the early April days. A few of the novelty decorative papers used by the stationery trade for the coming National Holidays such as Decoration day in crepes and patriotic colors in tissues sold well through those houses making a specialty of this class of paper wares, in both converted novelties or in the straight goods.

Those who are looking for saving possibilities in the Club Car deliveries of kraft have been taking advantage of the freely offered shipments of late days. With the present narrow purchasing market and hand to mouth buying the pooled deliveries have been freely patronized by Philadelphia distributors who are cautiously watching the trend of the paper market and confining orders to immediate requirements. Prominent New York paper brokers have been canvassng the Philadelphia trade through their local representatives securing small lot orders that bulk into considerable carload volume taken as a whole. These orders have been pooled into Club Car freight deliveries with each dealer taking care of his consignment on its arrival at local terminals. While much of the stock of this pooled transportation service is of the inferior or cheaper class of krafts in the No. 2. grades, very little of the No. 1 stock has been secured under such sales terms. In such markets as that of today with narrow purchases the Club Car method has been working to the advantage of the dealers in saving of warehousing and overhead of transportation and delivery service. The independent bag manufacturers have been able to take smaller and frequent orders through this pooled delivery service enabling the bag producers to keep within the market limitations on paper stocking. Better grades of krafts are steady despite the slower pace of business.

The tissue market, which had a spurt of improvement in early March on the better grades needed for the Pascal season, shows slow advancement for the cheaper stocks made of ground wood. The prices of these are now below pre war days. Toilet grades in this class of stock can be bought, locally, at very low cost, due to the reduced overhead in production. The finishing of this class of toilets has been consideably reduced by modern mechanical labor saving devices, cheaper packing cartons eliminating the old wooden packing cases and higher rates of transporting incident to the heavier casings. Recently wood pulp has been imported through this port as low as $25 per ton and manufacturers taking advantage of the lower prices are now able to produce cheaper tissue papers.

### Prices of Paper Stock Soar

Though the demand for many grades of paper stock has been slackened during recent days, the prices of some lines have been soaring in the urgent needs of mills for these raw materials. While the higher prices have been confined chiefly to the paper stocks there are a few rags that have likewise been seeking new altitudes. Book and ledger stocks have been raised from 15 to 40 per cent owing to the urgent mill needs and the scarcity of accumulations to meet present requirements. There is a persistent ordering from mills of book grades while ledgers and krafts have been equally eargerly sought in the present buying movement. Other grades of stock while scarce meet the day to day diminishing needs of the mills.

### Roofing and Wiping Rags In Demand

As the builders place their orders for paper supplies in roofing and other wares the rag dealers are experiencing a heavier demand for these grades. Since the tariff on wiping rags was advanced 10 per cent, making the present duty 20 per cent, the local dealers have been beseiged with orders for all lines of rags under this classification. The advance in the cost of wiping rags was from 10 to 15 per cent within the last ten days. There has been a scarcity of these grades owing to the dearth of foreign goods.

### Enterprise Paper Co. Merges With Joseph Hall Co.

The merger of the Enterprise Paper Company with the Joseph Hall Company became effective during the week when the stock of the latter distributor was removed to the headquarters of the former at 3rd and Callowhill streets. Both concerns have been connected with the wrapping paper and coarse paper specialty business in the Quaker City for several years. The Enterprise Company is controlled by Nathan Isen, A. B. Kehr and David Back, and is one of the larger central city houses featuring bags and a varied assortment of specialties in soda fountain paper goods, ice cream requirements, drinking cups, picnic outfits and other paper wares of like character. The Joseph Hall Company, has been engaged in the same line of business at 337 North 2nd street. It previously was owned by Joseph Hall, founder of the business. Upon his death more than 30 years ago the business was acquired by other interests. It eventually passed to the control of Harry Aroniwitz. With the consolidation of the business houses Mr. Aroniwitz joins the personnel of the Enterprise company.

### Lang Paper Co. Operates New Plant

The John Lang Paper Company, for many years located here, at 24th and Vine streets, today will begin operations at its new location on the site of the former Pusey and Jones shipbuilding plant in Gloucester, N. J. The Lang Mills are producers of

roofing papers and felts. The present site was acquired when the City of Philadelphia took over the old plant under condemnation proceedings for the purpose of enlarging the Parkway extending from City Hall to Fairmount Park. Though only part of the paper machines have been installed in the new Gloucester quarters they will be turned over to production of these builders supplies this week, so that there will be no suspension of business while the remainder of the equipment is being demolished in the Philadelphia headquarters preparatory to installation in the New Jersey plant. There are 150 hands employed in the new plant while others are being retained in the Quaker City plant pending the removal of the entire paper making units across the River. It is expected that the Lang company will be entirely settled in the new quarters by mid-summer.

### Felt Manufacturing Plant To Rebuild

Plans for the rebuilding of the plant of the Morocco Roofing Paper Company, on the site of the old mills, destroyed by fire last week, are now under way. The mills were owned by John H. Moore, of Philadelphia, and were operated near the Conowingo Power Plant at Rowlandsville, Md. The damage to stock and building was estimated at half a million. The new mills will be erected at a cost of $300,000, and will continue to produce roofing papers and felts. The new plant will be modern in details of construction of buildings and the newer mechanical units operated by electrical power from the Conowingo Power Plant.

### N. A. Considine Improving

Trade associates and the wide circle of friends of N. A. Considine, president of the Paper House of Pennsylvania, 30-32 North 6th street, were heartened by the reports of his improvement following his recent serious illness from pneumonia. While all but the family circle have been denied visits to his bedside at the University of Pennsylvania Hospital it is expected that he will have sufficiently recovered in the coming week to permit others to call. President Considine is one of the most popular of the younger group of paper men in the Quaker City, and until his health became affected a few years ago, was most active in promoting the welfare of the Philadelphia distributors through constructive activities in the Paper Trade Association.

### Plans Extension of Charles W. Williams Co.

A survey of the Philadelphia territory with a view to providing the paper box industry with additional service is planned by the Charles W. Williams Company, with local offices in the Bourse Building. It was planned to have this service survey made in the early days of the current month, but owing to the illness of Alfred Williams of the firm, General Manager George Buell, of the company, was obliged to postpone his trip to the city. Mr. Williams of the firm is confined to his home suffering from grippe and complications. General Manager Buell, who is also treasurer of the company, is planning to provide extensive displays of the various lines carried by the firm so that paper box men may have ready service in selection of papers and speedier shipments as the result of local stock exhibitions. Manager George W. Hallahan, of the Quaker City office, is now featuring the new box papers of the Williams company—the Flashtone a futuristic designed cover grade of vivid hues.

### George W. Ward To Remain In West

While it was as anticipated that President George W. Ward, of the D. L. Ward Company, would be able to return to his desk shortly after the Easter Holidays, his physicians have detained him in Tucson, Ariz., for an indefinite stay, because of his slow return to health. President Ward is suffering from a sinous infection of prolonged standing and intended to remain in the Western health resort for six months, having made the trip last Fall with the intention of returning this spring. On advice of his physicians he will remain in Tucson until summer time weather permits of the return home.

### J. Leonard Raymond Recovers Health

J. Leonard Raymond, of the firm of Raymond and McNutt, Sheridan Building, who has been recuperating at the seashore after an operation for appendicitis and several weeks confinement to the hospital, is again at his desk.

## Copper Dam Bill Passed

MONTREAL, Que., April 16, 1928.—Although strenuously opposed, the bill authorizing the construction of what is known as the Copper Dam has been passed by the New Brunswick Legislature.

The matter is one involving a great many interests and, in its nature, is international—Canada, the United States, the Province of New Brunswick, the State of Maine, all being affected together with the International Joint Waterways Commission.

The basic root of the proposition are remarkable tidal waters of the Bay of Fundy which with their rise and fall constitute one of the wonders of the world. In Passamaquoddy Bay the rise and fall is some 28 feet and by means of dams, bridging various islands the proposition is to utilize this natural energy so as to develop many hundreds of thousands h.p. of electrical energy. The possibility of harnessing these tides to industrial purposes has long been the dream of engineers and of late years Dexter P. Cooper has given considerable attention to the matter and had evolved the proposition which is now before the public, with this gigantic scheme involving the outlay of many millions of dollars. A small army of delegates spoke before the committee for and against the proposal, among those opposing the bill as presented being the Canadian Cotton, Ltd., Mt. Stephen; Maritime Electric, Ltd., the towns of St. Stephen and St. Andrews, Connors Bros., Ltd., of Black's Harbor, the largest packer of sardines in the Empire and others.

Counsel for the Dexter P. Cooper Company explained that the incorporation already granted by the Federal Government gave authority to construct dams, expropriate lands, etc., none of these powers to be exercisable, however, till plans had been approved by the Minister of Public Works and the Department of Marine and Fisheries at Ottawa, and the apportionment of power as between New Brunswick and Maine by the International Joint Waterways Commission after receiving approval of the Governor-in-Council. The estimated cost of the development is placed at from $50,000,000 to $75,000,000, and initial development would range from 400,000 to 500,000 h.p., ultimately reaching 700,000 or 800,000, the construction requiring some 42 months with some 3,000 or 4,000 workmen.

## Liberty Paper Board Co. Busy

[FROM OUR REGULAR CORRESPONDENT]

STUBENVILLE, Ohio, April 17, 1928.—The Liberty Paper Board Company, which succeeded to the plant of the Hartje Paper Manufacturing Company here, reports very gratifying success since starting operations about the middle of February. Orders have been received from many customers who formerly bought the product of this mill.

The plant is at present turning out about forty tons per day, regular grades of dry finish butchers, steam finished butchers, water finished butchers and 40 pound silk fiber. The company expects to be making kraft very shortly.

L. E. Barnes, of Pittsburgh, is sole distributor for the company's product.

## The C-E Air Preheater

A new catalog has been issued by the Combustion Engineering Corporation, 200 Madison Avenue, New York, N. Y., describing the C. E. Air Preheater. Practically every new power station of any size is being equipped with preheaters.

# Fox River Valley Paper Mill Activities

## Menasha Printing & Carton Co. Increases Productive Capacity by Installation of New Four-Color Press With Output of 125,000 Wrappers Per Hour—Paper Manufacturers Support Proposed Amendment to Federal Forestry Laws Increasing Research Fund

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 16, 1928.—Installation of a new four-color press has been completed by the Menasha Printing and Carton Company, of Menasha, Wis., thus greatly increasing the productive capacity in the wrapper section.

Designed specially to meet the needs of the carton company, it prints a sheet 84 inches wide, at a speed of 48,000 feet an hour. Although the press can be used for any kind of work, it will be devoted primarily to the printing of waxed bread wrappers. Its output is 125,000 wrappers an hour of the 15 by 21-inch size.

Engineers from the Kitter Press Company, of Dover, N. H., spent some time at the plant studying the needs of the company before designing the press. About seven months was required for its construction. It weighs approximately 34 tons, is 22 feet long, 10 feet wide and 11 feet high. The press is equipped with automatic oilers and an electrical control system capable of stepping the operation up to 15,000 revolutions.

### Safety School Banquet Planned

An attendance of 2,800 is expected at the closing banquet of the Foremen's Safety School conducted during the winter and early spring months at Milwaukee, Wis. The banquet will be held May 16 at the Auditorium, at which time graduation ceremonies will take place. Dr. Ralph Kayser, former Milwaukee police surgeon, who has been touring the west inspecting industrial hospitals and clinics, will be the speaker. Walter S. Smith is in charge of the arrangements.

### Fox River Dam Improvements

New sluice gates will be built this spring on the Fox river dam which serves the paper mills at DePere, Wis., according to announcement of A. F. Everett, of the United States Engineering Department. Approximately $100,000 will be spent on the new sections. The "cissons" used in construction of a dam at Kaukauna, Wis., recently will be moved down the river and used for coffer dams on this project. They are pumped full of water so they will sink, and then are anchored.

### New Interlake Digester Building

Excavation work has been started by the Interlake Pulp and Paper Company, of Appleton, Wis., for the foundation of the new $350,000 digester building which is contemplated by the parent company, the Consolidated Water Power and Paper Company. The company is doing the work with its own engineering staff and day labor. Completion is expected by December, 1, 1928.

### Tomahawk Tree Growing Project

Following up the recent Wisconsin Commercial Forestry conference and the need for action in reforestation, the Tomahawk Kraft Paper Company, of Tomahawk, Wis., is setting an example by launching into a tree growing project. A tract of 100 acres of cut-over land is to be planted with seedlings from the state nursery at Trout Lake. About 200,000 trees will be grown on this tract, suitable for pulpwood.

Paper mills generally are giving their support to an amendment to the federal forestry laws which will give the Department of Agriculture an appropriation of $47,000 for research work at the Lake States Experiment Station at St. Paul, Minn. The amendment increases the fund of $27,000 originally provided for this work by $20,000 so that the purchase and establishment of seed farms for forest trees will be possible. Study also will be devoted to the selection of trees best adapted to climatic conditions in the lake states. It is expected that this move will help in the setting aside within the next few years of at least 100,000 acres in Wisconsin, Michigan and Minnesota for reforestation. The amendment already has been passed by the senate.

### Wolf River Operations Resumed

Operations have been resumed by the Wolf River Paper and Fiber Company, of Shawano, Wis., after a shutdown for several days. This was the annual recess for repairs.

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## Blake, Moffitt & Towne Open Department

SAN FRANCISCO, Cal., April 12, 1928.—When a wholesale and jobbing firm departs from the routine in the matter of office appointments and makes color and beauty the keynote of its setting it is something worthy of attention. Feeling that in their busy crowded offices fine papers and fine printing could not be given the careful consideration that they deserved, Blake, Moffitt & Towne, pioneer paper merchants of San Francisco, have just made some important and interesting changes in their office arrangements.

Toward the front of the building a mezzanine floor has been constructed which houses the new quarters for the Promotion Department. A short stairway flanked by a railing of ornamental iron effect leads directly to the colorful room which has been done in the early California manner. The warm tinted walls have the effect of travertine, while the vaulted ceiling above carries the rich old tones of terracotta red with beams of blue embellished with gold.

Behind graceful arches lights shine down on exhibits of specimens of fine printing and interesting displays of advertising. Because the Promotion Department is devoted to the task of providing customers of the house with ideas and suggestions on printing and advertising, a cabinet of natural wood contains several thousand specimens collected all over the United States as well as from Europe. These have all been filed in logical order and so as to insure ready reference.

A description of this unique room would not be complete without mentioning the two attractive old Spanish doors which lead from either side of the room into other parts of the building. Constructed of weatherbeaten wood, with attractive rounded tops and huge decorative hinges these doors add a rich touch to an effective and well carried-out design.

The new quarters from the Promotion Department were formally opened on Saturday, April 7, when a large group of friends and customers of this old pioneer institution called to see the improvements and learn of the features of this new service now being offered in San Francisco.

"Step up the stairs to new ideas," read the cordial invitation mailed to several thousand business people of Northern California and many came from not only San Francisco but from out of town points as well.

In addition to the exhibits of modern printing and advertising with their sprightly and colorful designs an exhibit of rare old volumes, the property of J. K. Moffitt, president of the firm, was an added feature of the occasion which attracted much interest.

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## Paper Production Number Lower

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 16, 1928.—Production number for paper for February was 98 compared with 104 for January and 106 for February of last year, taking 1919 at 100, according to the Department of Commerce.

# BIRD SCREENS

## For Capacity

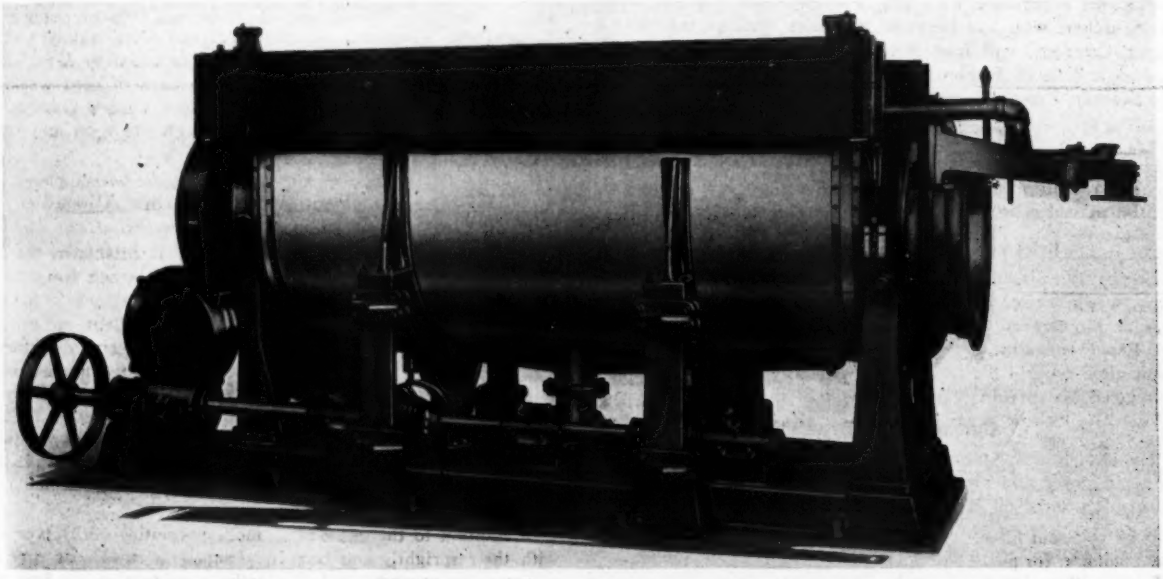
The Bird Screen is the screen for continuous production at high speeds. Compare it with any other screen for daily or yearly tonnage on any given stock.

## For Quality

The finest papers of every grade pass through Bird Screens They produce *clean* stock continuously.

## For Low Cost Per Ton

Operation and maintenance cost is at its lowest in the better Bird Screen. Users regard it as a negligible factor.



## BIRD MACHINE COMPANY

South Walpole : : Massachusetts

1855

# Chicago Paper Market Practically Unchanged

## News Print Situation Continues Favorable With Consumption Being Maintained in Heavy Volume—Book Paper Distributors Experience Improved Demand—Fine Papers and Tissues Still in Excellent Request—Cover Papers in Fairly Good Shape

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 16, 1928.—Conditions in the Chicago paper market are little changed over last week with the exception that the nearness of genuine spring weather has painted all reports with a more optimistic color. It is no news that the citizens of Chicago swarmed to the polls in the primaries of the 10th and severely crushed the political power of the Thompson-Small-Crowe factions. Chicago paper men believe this change in politics will benefit business in Chicago and vicinity even though business was temporarily halted on primary day.

News print is in a favorable condition with the demand good. Chicago newspapers carried extra editions during the counting of the primary votes and the pre-election "dope" accounted for a great deal more reader interest that consumed more newsprint. Advertising volume continues good. Book paper is getting stronger each week with a fair expansion looked for as spring becomes more and more a reality. The fine paper market is reported as better than one year ago at this time. Tissues are good. Cover papers are in fair shape with representatives of some coated paper mills reporting their mills far behind in orders. Kraft shows a slight improvement.

### Erickson Joins Pratt Paper Co. Staff

From the Seaman Paper Company comes the news that O. P. Erickson, formerly with the Seaman Paper Company, of Des Moines, Iowa, has joined the staff of the Pratt Paper Company of the same city. Mr. Erickson will be manager of the fine paper department, a position he is well qualified to fill following his experience with the Seaman Paper Company. W. H. Crutcher, who has been on the sales staff of the Seaman Paper Company, will take Mr. Erickson's position. R. V. McCollum and G. H. Bolten have been added to the sales force of the Seaman Paper Company, Des Moines.

### George K. Gibson Returns

George K. Gibson, Mosinee Paper Mills Company, has returned to Chicago after a three weeks sojourn in Florida. Mr. Gibson played a lot of golf and enjoyed himself thoroughly.

### Salesmen Entertain George W. Sisson

George W. Sisson, 111., of the Racquette River Paper Company, was a visitor in Chicago last Monday and a guest at the regular Monday noon meeting of the Salesmens Association of the Paper Industry. James Coy, president of the national organization, reports that a good crowd and plenty of enthusiasm convinced Mr. Sisson of the liveliness of the Chicago Division.

### Gummed Tape Broadside

The Mid-States Gummed Paper Company, manufacturers of gummed paper and cloth, has recently issued a well gotten up broadside printed on Mid-States "Really Flat" gummed paper in four colors, process printing, which has just been sent to every printer, lithographer and job press in the United States. At the same time, wholesale paper merchants representing the big Chicago organization are being furnished with envelope inserts also printed in four color process printing. The broadside well illustrates the practicability and usefulness of poster stamps as used to focus attention, to serve as reminders or to popularize a trade mark or slogan. Several attractive illustrations in four colors are used. A number of additional uses for gummed paper are listed, these uses including gummed papers for descriptive labels on merchandise to identify the product, to designate sizes or styles, catalog numbers, etc., to call attention to certain features, for shipping labels, address labels, carton labels, to announce corrections and change of address, etc. The broadside and the mailing list used in sending it constitutes one of the most extensive of its kind put on by any gumming manufacturer.

### Chicago Paper Association Cost Survey

The Chicago Paper Association held its regular meeting last Tuesday evening, April 10, at the Bismarck Hotel. The meeting was well attended and very interesting. Members present discussed the recent survey of the costs of doing business.

The frank comments on the results of these surveys provide an interesting meeting. A number of requests have been received from paper houses in all parts of the country for the results of the survey. The Chicago Paper Association also discussed unfair tactics, misrepresentation and other abuses, such as short counts and weights, all of which the organization strongly discountenances. News of such practices has been reported by members and efforts are being made to endeavor to eliminate them. This next meeting of the association will be held April 24.

### Edgar A. Hall, Sr., Recovering

Edgar A. Hall, Senior, whose illness was commented on in the last issue of the Paper Trade Journal, is improving and on last reports is getting along even better than was expected. The many friends of the vice president of the Pilcher-Hamilton Company will be very glad to hear this most welcome report.

### Notable Trade Visitors

Alexander Thomson, vice president and sales manager of the Champion Coated Paper Company, accompanied by Mrs. Thomson will be visitors in Chicago for two days of next week.

J. B. Jones, of the Western Newspaper Union, Omaha, was in Chicago last week after a trip through the west and southwest territory.

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## Frank T. Sisson Returns From Abroad

[FROM OUR REGULAR CORRESPONDENT]

POTSDAM, N. Y., April 16, 1928—Frank T. Sisson, of the Racquette River Paper Company, returned last week from an extended tour of Europe and Africa and is again back at his desk in the office of the paper company at Unionville.

Mr. Sisson is one of the best known musical directors of Northern New York and has for years interested himself in the musical life of Potsdam. In addition to his duties with the Racquette River Paper Company he has served for 35 years as choirmaster of the Presbyterian Church in Potsdam. During all these years Mr. Sisson has been turning his salary as choirmaster back into his choir for new music, improvements to the organ, etc.

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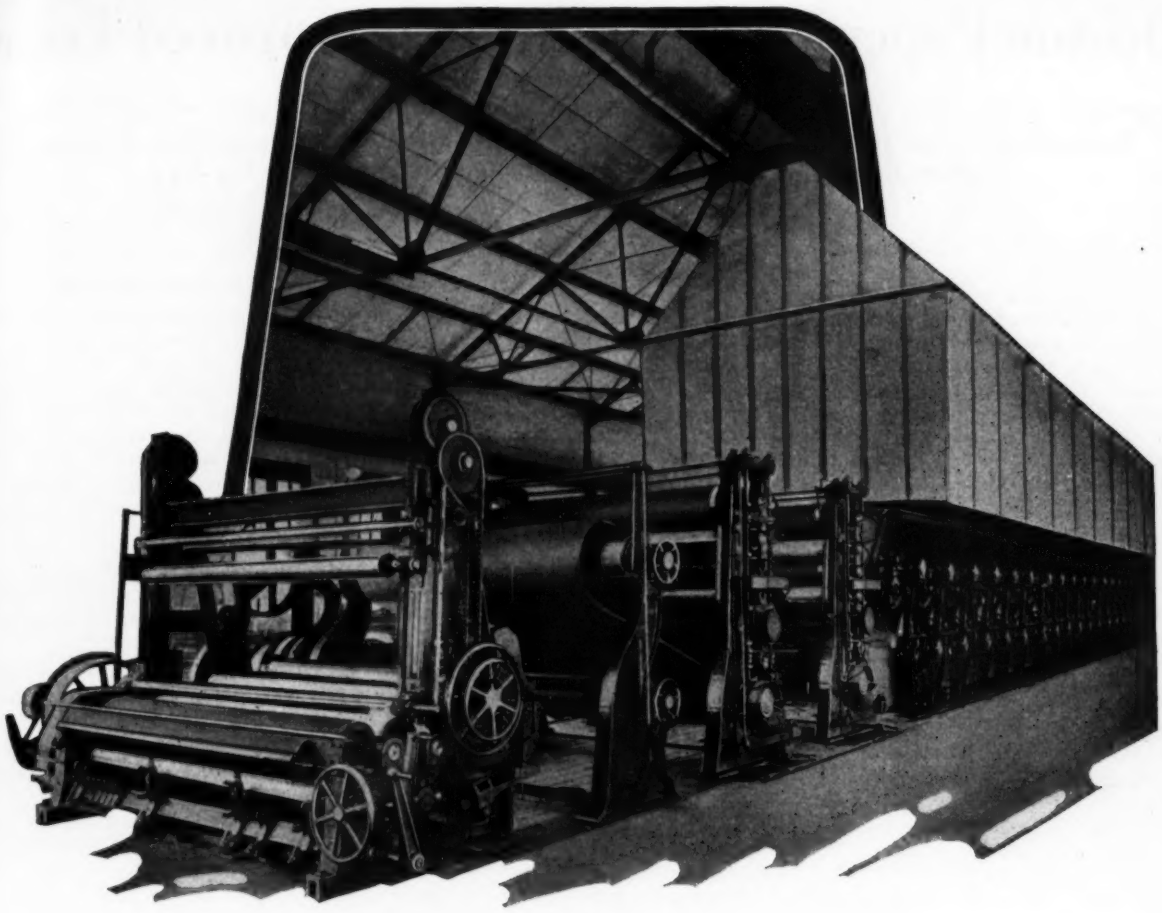
## N. E. Paper Merchants Meet at Springfield

SPRINGFIELD, Mass., April 17, 1928.—Over 50 members of the New England Paper Merchants Association attended a banquet and business meeting at the Hotel Kimball last week. There were representatives present from Waterbury, New Haven, Hartford, Holyoke, Boston and this city. Papers were read on trade topics by Arthur Blackburn, manager of D. Munroe & Co. and M. O. Byrne of Whitney Brothers both of Boston. A general discussion followed.



# Five Repeat Orders for Paper Machines

**Twenty-five years ago the Hinde & Dauch Paper Co. purchased their first paper machine from us, and since that time they have purchased nothing but Downingtown Machines. They now operate six paper machines built by Downingtown, which is certainly undeniable evidence of satisfaction.**

**The illustration shows the Finishing End of the new machine which was recently installed in their Trenton, Ontario mill. This machine, a Keystone Removable, Adjustable, Shakeable Fourdrinier makes kraft paper and light weight specialties. It has a 126" wire, 75' long, and is equipped with a Kilberry Suction Couch and Suction Press Roll.**

**When in need of a Fourdrinier or Cylinder Machine remember that a successful concern like Hinde & Dauch would never purchase six paper machines from us, unless they had some particularly good reasons.**

Our Products Meet Our Promises

**DOWNINGTOWN Fourdrinier**

Downingtown Mfg Co. Downingtown Pa.

# Boston Paper Market Exhibits Improved Trend

## Approach of Warmer Weather Influencing Activity to Considerable Extent—Coated Paper in Particularly Good Request at Present Time—Outlook for Kraft Papers More Favorable —Box Board Industry Steady With Quotations Holding Up Well

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 16, 1928.—Conditions in the paper market, by and large, are practically the same as those of a week ago. It is still spotty, with some concerns transacting a good volume of business, while others report a rather listless market. The trend generally is towards improvement, the warmer days influencing activity to a considerable extent. Coated paper is particularly in demand. The Middlesex Products Company had the best first quarter that this concern ever had. In spite of the great demand the company has been able to keep an ample supply on hand so as to avoid delays in shipment for all orders for immediate delivery. The outlook for kraft remains favorable.

Wholesalers of box board find the market continuing steady with prices maintained at the same levels, although conservative buying persists. Some orders in sizable quantities have beeen put through.

In waste paper the prospect is brightening up to some extent, although the demand from some mill districts has fallen off. Quotations are unquotably changed, except that No. 1 old manila is valued at 1.20 to 1.25 compared with a former range of 1.25 to 1.35, f.o.b., Boston. Sulphite screenings wrapper is quotable at $15 a ton, f.o.b., Boston. One of the most important consumers of No. 1 mixed papers in the East has cut his price 50 cents a ton, and sellers have had no alternative but the acceptance of the lower price.

Bagging is generally quiet, but some changes have taken place. Foreign gunny No. 1 is quotable at 1.80, compared with 1.75 a week ago; domestic gunny at 1.55 @ 1.60, compared with 1.65 @ 1.75; foreign manila rope and strings 2.65 @ 2.80, compared with 2.6½ @ 2.75; mixed strings .95 @ 1.00; compared with .90 @ 1.00; scrap burlap 1.25 @ 1.30 compared with 1.50 @ 1.62½; heavy wool tares 1.35 @ 1.50, compared with 1.65; new burlap cuttings 2.00, compared with 2.25 @ 2.37½. There is a routine business in rags, but no grade is said to be in snappy demand. Prices, however, have not declined.

### Paper Merchants Hold Successful Meeting

Paper men present expressed unanimous opinion that the meeting of the New England Paper Merchants Association held at the Hotel Kimball, Springfield, Mass., Wednesday evening, April 11, was the best ever held in that section. About sixty were present, including, besides the Boston men, delegations from Waterbury, New Haven, Hartford, Meriden, and New Britain in Connecticut, and from Pittsfield, North Adams, Holyoke and Springfield in Massachusetts. Charles L. Beckwith, of the H. W. Carter Paper Company, Springfield, presided. "Net Profit Control or Correct Cost Accounting as Applied to Paper Merchandising" was the principal topic of the evening, in which great interest was shown.

M. O. Byrne, president of the Association, in his address, discussed the satisfactory way in which merchants have been applying the cost of their goods saying that in a number of instances the only cost thought of by the average merchant was that of the paper at the mill, plus the freight, with no consideration given by a great many to fixing overhead expense which should apply to the costs of the goods in the merchant's warehouse. An interesting discussion followed. The meeting was arranged principally for the benefit of merchants not members of the Association. That this endeavor was successful is evidenced by the fact that several non-members present have made applications to join. Besides President Byrne, those from Boston included Vice-president Arthur E. Ham, A. W. Blackman, president of the D. F. Munroe Company, and S. L. Ginsburg, of Ginsburg Brothers.

### Tentative Program for Providence Meeting

A tentative program for the Providence meeting of the New England Paper Merchants Association has been arranged. Efforts are being made to secure George W. Olmstead, of the S. D. Warren Company, as one of the speakers. Frank Floyd, secretary of the National Paper Trade Association and A. H. Chamberlain, assistant secretary of that association, are expected to be present. As has been previously announced in these columns, the dinner is to be held at the Baltimore, Tuesday evening, May 8. The next day there will be a program of sports at the Wannamoisett Golf Club.

### News of the Trade

The Kenneally Paper Company notes a continually increasing volume of sales. The first quarter of the year was the best ever for this concern. The present good business of the company recalls the year 1921, when it sold more than in 1920.

John Carter & Co., Inc., are issuing a new sample book of the enlarged line of Ranger Cover made by the Holyoke Card and Paper Company, Springfield, Mass.

The Dill & Collins Company, Philadelphia, is supplying New England customers with new sample books of Multycolor, coated one side.

Frank Merrill, president of the Andrews Paper Company, sailed Saturday, April 7, on the Cunard liner *Carinthia* for a Mediterranean cruise of rest and recreation. He may return via London and call on a house in that city from which his company imports.

Colonel J. P. Jordan, who has been closing up the busineess of the Jordan Card and Paper Company, has returned from a two-week's trip to Savannah, Ga., on the *Columbus* of the Ocean Steamship Company.

William G. Snow, treasurer of the Middlesex Products Company, has returned from a two weeks' vacation in South Carolina. H. S. Brown, sales manager for Carter Rice Company, Corporation, is at his desk again after a three weeks' vacation.

Orrin C. Robinson, of Hinsdale, N. H. a paper manufacturer for many y ears and well known to Boston merchants; William L. Daniels, of the L. L. Brown Company, Adams, Mass., George Weaver, of Farret & Burnhan, Philadelphia; and Mr. Stone of A. M. Collins, Philadelphia, called on the trade last weeek.

There is a tendency for both polished and unpolished twine to advance. Jute twine is rather quiet.

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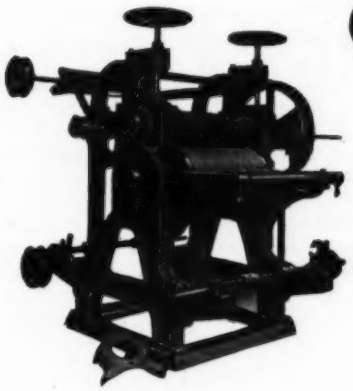
### Fibreboard Co. Insures Employees

SAN FRANCISCO, Cal., April 12, 1928.—A group insurance program that will eventually provide more than $4,000,000 of life insurance for its employees has been adopted by the Fiberboard Products Company, Inc., of San Francisco. On March 31 over 2000 employees received as a gift from their employer, approximately $2,000,000 of life insurance. Subsequently, employees will be given the opportunity to purchase, in co-operation with their employer, $2,000,000 of additional life insurance. $2,000,000 of accidental death and dismemberment protection and health and accident insurance. The triple coverage group plan is being underwritten by the Metropolitan Life Insurance company.

The Fiberboard Products company has two plants in San Francisco, three in Los Angeles and one each in Antioch, Stockton, Long Beach, San Diego, Cal., and Summer and Port Angles, Wash.



# Embossing
## SPECIALTY
## BOX PAPER

150 FT. TO 250 FT. PER minute

OPEN FRONT

## WALDRON EMBOSSER

WITH HIGH SPEED BEARINGS

For the specialty box paper manufacturer who finds frequent change of engraved designs necessary due to small runs, this modern Waldron Embossing Machine can effect substantial savings in operating costs.

The 1 to 2 ratio between steel and paper rolls holds down engraving cost and the production cost is considerably lowered by tripling the speed over that of the plain bearing machine. Power absorbed by this high speed machine is no greater than that absorbed by the plain bearing equipment.

*Our Engineering Department will Gladly Give You Helpful Information Regarding Lowering Costs and Improving Quality of Product.*

WALDRON

Paper Rolls (Calender and Embossing)
Coating Machines
Printing Machines
Winders and Slitters
Gumming, Waxing and Saturating Equipment
Crepeing Machines
Conditioning Machines

## JOHN WALDRON CORPORATION
MAIN OFFICE AND WORKS, NEW BRUNSWICK, N. J.

208 W. Washington St.
CHICAGO

30 East 42nd Street
NEW YORK

# Demand for Paper Satisfactory in Toronto

## Distributors Report Considerably Improved Demand for Practically All Grades of Paper—Fine Paper Market Continues to Exhibit Strong Undertone—Book Paper Manufacturers Exceptionally Active—News Print Mills Curtail Production

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, April 16, 1928.—With the printing trade quite busy and with business generally throughout the province pepped up in advance of spring, the wholesale paper trade is having a considerably better turnover in nearly all paper lines than it had during the pre-spring season of last year. With four months of the year about gone the record of business has been most satisfactory and while a few lines dragged for a short time a few weeks ago, there appears to have been a gradual improvement in trade of late which will more than make up for any loss and average up a good half-year.

There is a good demand for all fine papers and while big lot selling has never been resumed to any great extent there have been many orders of fair size and these have bulked large. A lot of book and catalogue paper is being consumed by printers, most of whom, particularly the larger firms, are extremely busy. Two years ago printers in Canada were crying for business and getting little. Now many of them are overwhelmed with work. A leading Toronto printing house, unable to cope with the demands upon it, went to a firm that does custom press work, and asked to have certain jobs done. It could not handle in its own press room all the printing jobs it had on its books. The firm approached could only be induced with great difficulty to take over the work. The plant was too busy to take care of the work.

A firm that purchases large volumes of book paper each year switched an account running into six figures annually from one book paper manufacturer to another. He did not receive one word of protest from the manufacturer who lost the account. The latter was too occupied with trying to fill other orders that he had on hand.

### News Print Demand Drops Off

Latest available figures give the rated capacity of the Canadian news print mills at 8,420 tons a day, as compared with 5,992 for United States mills and 735 tons for Newfoundland and Mexican mills. The daily capacity of the news print machines in use in Canadian pulp and paper mills show an increase of 18 new news print machines, and an increased daily capacity of 1,665 tons by the end of 1927. Up to the present time sixteen new machines with a total daily capacity of 1,665 tons have been placed in operation this year. In 1926 the mills added fourteen new machines with an aggregate capacity of 1,315 tons. The capacity of the Canadian news print mills has been steadily increased from year to year, but it is thought that with the completion of present expansion plans a halt will be called, and no further machines will be installed for a time at least. The rapid growth in the number of news print mills in Canada, and the large number of new machines put into operation during the past few years has proved too great for actual consumption demands. This has reacted in a lessened demand so that the mills have had to curtail their production. It is, therefore, thought that the pulp and paper companies after completing their present construction programs will mark time until an increased demand for their product warrants further development of their equipment.

### Abitibi Pulpwood Operations Cease

The operations at Lake Du Parquet of the woods department of the Abitibi Power and Paper Company, at Iroquois Falls, Ont., are practically closed for the season. The delivery of wood purchased from Quebec settlers is also practically finished and a lot of this wood will be driven. The purchase of pulpwood from Ontario residents mostly along the Temiskaming and Northern Ontario Railway has been concluded. The total output of limit and purchased wood of the Abitibi Company was 215,000 cords. This is quite a triumph for the organization in the matter of having the work carried out so successfully, considering the depth of snow was much greater than a year ago and also came much earlier in the season, causing a good deal of extra labor in operation, chiefly in keeping the roads open. The next job will be driving most of the wood to the mills of the company. The cruise of the timber limit of the Abitibi Fibre Company is not yet completed. It has been suspended for the time being but will be resumed about June 1.

### Reducing Forest Fire Dangers

Discussion of fire dangers in Northern Ontario and of measures looking toward the prevention of outbreaks in the forest areas marked a meeting in the office of the Minister of Lands and Forests, in Toronto, this week, at which were present representatives of the Dominion Railway Commission, the Canadian National Railways, and the several pulp and paper companies interested in the district from Cochrane west to Hearst. The Deputy Minister in charge of Forestry, the Chief Forester in charge of the fire service, and the foresters of some of the companies were present. Good feeling prevailed and the various interests agreed to co-operate in dealing with the situation. Arrangements were made for an immediate inspection of the locality by experts of the department, of the railways and of the pulp and paper companies, and a general plan will be worked out for the disposal of the slash and for precautions against fire in the coming season. Alarming reports were published as a result of a discussion that took place at the annual forestry and fire meeting at Sudbury recently. The situation has been canvassed and it is declared every precaution has been taken to preserve property and life and prevent fires. The department and the various interests affected have agreed on a policy for the year. It is believed they will be able to take care of the situation.

### Reforestation Around Port Arthur

An ambitious program of reforestation, which will include the establishment in the Port Arthur district by the Ontario Forestry Branch of a large nursery, and the setting out of acclimatized trees in approximately 10,000 burned over acres in the district, has been outlined by the Ontario Government. In reference to the Government's determination to reforest this section of the Province, it was stated that it was prepared to set out as many trees as is necessary. The Department has three nurseries producing approximately 10,000,000 trees. It is ready to set out anywhere from 100,000 to 1,000,000 trees in the Port Arthur district. The establishment of a nursery there means that the Government will grow trees from the seed and will see that every tree is acclimatized before being placed in the ground. A considerable sum of money will be expended in this and future work in the Thunder Bay District.

### Notes and Jottings of the Trade

The office, storehouse and cement sheds at the construction plant of the Great Lakes Paper Company, Fort William, Ont., were destroyed by fire a few days ago. Officials of the company

(*Continued on page 78*)

# WHAT PRICE PER TON?

## WHAT DOES IT COST PER TON IN YOUR BEATER ROOM?

*Dilts NEW TYPE Beaters on Kraft*

A certain mill in the "Middle West" has effected beater power saving of 31.7% per ton of stock after installing Dilts NEW TYPE Beating Engines*

Other mills using Dilts NEW TYPE Beaters show similar good results.

How can YOU meet competition against those mills if you continue to operate with your old beater equipment? Your cost per ton will be too high.

*See page 31, The Paper Trade Journal, issue of January 26.

In the year just ended, the sales of Dilts Beating Engines increased 117% over the previous year.

There is no question about the superiority of the Dilts NEW TYPE Beating Engines, and the progressive mills are rapidly installing them.

Among 1927 sales are NEW TYPE beater equipments to the following mills:

The Southern International Paper Co., Backus-Brooks Company, Lincoln Pulp & Paper, Ltd., Tumwater Paper Mills Company, St. Regis Paper Company, West Jersey Paper Manufacturing Company, Howard Smith Paper Mills, Ltd., Grays Harbor Pulp & Paper Company, U. S. Rubber Company, Southern Advance Rag & Paper Company, E. B. Eddy Company, Ltd., National Paper Products Company, Provincial Paper Mills, Ltd., Consolidated Paper Company, United Paperboard Corporation, International Fibre Board Company, Ltd.

You should fall in line. "Your paper is made in your beaters." You are vitally interested in reducing your cost per ton.

**Dilts**

**MACHINE WORKS, Inc. FULTON, N.Y.**

EXPORT OFFICE ~15 PARK ROW~ NEW YORK CITY

# CONSTRUCTION NEWS

*A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills*

### Construction News

**Buffalo, N. Y.**—The Laclede Manufacturing Company, 1443 Niagara street, manufacturer of card stocks, etc., is completing plans and will soon take bids for the construction of a new plant on Northman Avenue near Fillmore Avenue, to be one-story, reported to cost close to $90,000, with equipment. E. G. Speyer, Ellicott Square Building, is architect and engineer. B. W. Burleigh is president.

**Scotia, Cal.**—Officials of the Pacific Lumber Company, Scotia, are reported to have plans maturing for a proposed new pulp and paper mill near its redwood lumber mills, consisting of a group of buildings to be equipped for an output of about 150 tons per day. Waste from the lumber mills will be used as source of raw material. Application has been made to the State Department of Public Works for water rights to secure power for operation of mill. It is understood that a company will be organized, to be operated as a subsidiary, to carry out the project.

**Boston, Mass.**—The Glove Paper Box, Inc., 241 Albany street, Boston, has leased factory space from the Thomas G. Plant Corporation, Center street, Jamaica Plain, manufacturer of shoes, and will remodel and improve the space for a new plant unit. It is proposed to install equipment at an early date.

**Tampa, Fla.**—Harvey M. Mansfield, 3032 Spruce street, Tampa, is at the head of a project to establish and operate a plant in this vicinity for the production of kraft papers, and inquiries are being made for suitable equipment for installation. It is also proposed to construct a sulphate pulp mill for raw material supply on site adjoining paper mill unit. A company will be formed to carry out the project.

**Chicago, Ill.**—The Federal Folding Box Company is taking possession of portion of building at 1214-8 North Wells street, recently leased for plant expansion, and will occupy at an early date. It is understood that present factory at 1024 West Van Buren street, will be removed to new location.

**Monroe, Mich.**—The Monroe Paper Products Company has begun superstructure for its proposed new plant addition at West street and Elm avenue, to be used for the production of paper boxes and cartons. It is reported to cost close to $40,000, including equipment. W. R. Harris is manager.

**Jersey City, N. J.**—Fire, April 5, damaged a portion of building of the United Wall Paper Factories, Inc., 151-71 West Side avenue. An official estimate of loss has not been announced. The damage will be replaced.

**Wheeling, W. Va.**—The United States Corrugated Fibre Box Company, Seventeenth street, is reported to have plans nearing completion for a proposed new plant addition, to cost close to $100,000, with equipment. H. J. Lacy is an official of company, in charge.

**Tuscaloosa, Ala.**—The E-Z Opener Bag Company, Decatur, Ill., is expected to ask bids before the close of the month for its proposed new plant at Tuscaloosa, where tract of land was acquired several months ago. The main unit will be one-story 280 x 600 feet, brick and steel, and is reported to cost in excess of $600,000, with equipment. Other units will be built at a later date with large aggregate investment. William E. Spink, Pere Marquette Building, New Orleans, La., is architect for the project. R. E. Hartman is general manager, with headquarters at New Orleans.

**Milwaukee, Wis.**—The Cream City Wiper and Waste Paper Company, 453 Fourth street, is having plans completed for a new one-story and basement factory, 50 x 92 ft., at location noted, and will take bids on general contract at an early date. It is estimated to cost about $17,000. Siebert & Kegler, 230 Wisconsin Avenue, are architects.

**West Pittston, Pa.**—The Exeter Paper Corporation, Sullivan Road, near West Pittston, is reported planning for early rebuilding of portion of plant, destroyed by fire April 12, with loss approximating $85,000, including equipment. The capacity will be increased.

**Kansas City, Mo.**—The Waxide Paper Company, Twentieth and Tracy streets, manufacturer of waxed and other processed papers, has arranged for an increase in capital from $150,000 to $400,000, a portion of proceeds to be used for expansion, particularly in connection with a proposed new plant at St. Louis, Mo., recently projected, where tract of land has been acquired at Newstead street. Main unit will be one-story, 100 x 275 feet. It is understood that plant will cost close to $200,000.

**Little Rock, Ark.**—The Southern Paper Box Company, recently organized by A. Karchner, 503 East Seventh street, Little Rock, and associates, with capital of $100,000, is said to be perfecting plans for early operation of local plant for manufacture of paper boxes and containers.

**Adams, Mass.**—The plant and property of the Berkshire Hills Paper Company, Howland avenue, Adams, will be sold by John F. Noxon, Jr., special master, at a foreclosure sale. The sale will include all real estate of the company as well as factory buildings, machinery and fixtures, and power house.

**St. Louis, Mo.**—The Barnard Stationery Company, Vandeventer and Laclede streets, has awarded a general contract to the Murch Brothers Construction Company, Railway Exchange Building, for alterations and improvements in its two-story factory at location noted.

**New York, N. Y.**—The American-Russian Chamber of Commerce, 50 Broad street, New York, reports that plans are under way for a new cellulose and paper mill in the vicinity of Ussuri Station, Siberia, to be operated under the direction of the Russian Soviet Government. The entire project is reported to cost close to $5,000,000, with machinery and equipment, considerable of which will be secured outside of that country.

**Milwaukee, Wis.**—The Milwaukee Printing Company, 377 Florida street, manufacturer of wrappers for food products, paper cartons, boxes, etc., will proceed with construction of new addition to its plant for large increase in present output. It will be six-story, 85 x 130 feet, reported to cost close to $200,000 with equipment. Majority of machinery will be electrically

# SOLVAY PRODUCTS

## SODA ASH
## CAUSTIC SODA
## LIQUID CHLORINE

*Contract or Spot Delivery*

**In tank cars and multiple unit cars**

*Write for Prices*

**SOLVAY SALES CORPORATION**

Alkalies and Chemical Products Manufactured by
The Solvay Process Company

40 RECTOR STREET NEW YORK

**Boston** **Syracuse** **Chicago** **Indianapolis** **Cleveland**
**Cincinnati** **Pittsburgh** **Detroit** **Philadelphia**
**Kansas City** **St. Louis** **Atlanta**

operated. Tharinger & Bruecker, 774 Third street, Milwaukee, are architects.

**Victoria, B. C.**—The Canadian Forest Products Company, Ltd., Victoria, has plans in preparation for a pulp and paper mill, and hydroelectric power project on the Nimkish River, British Columbia. It is proposed to proceed with hydroelectric power unit at an early date, with estimated cost placed in excess of $750,000, including equipment. Closely following work will proceed on the pulp and paper mill unit.

**Brooklyn, N. Y.**—Thompson Vespole, 31 Meeker avenue, Brooklyn, paper stocks, has filed plans for the construction of a new one-story factory, 46 x 103 feet, at 128-32 Bayard street, reported to cost close to $20,000, with equipment. French & Lefante, 40 East 49th street, New York, are architects.

**Buffalo, N. Y.**—The duPont Cellophane Company, Inc., River road, manufacturer of special processed papers, is said to be completing plans for a proposed new addition to its mill, to be one-story, reported to cost in excess of $225,000 with machinery. A list of equipment for installation is being arranged. The duPont Engineering Company, duPont Building, Wilmington, Del., is engineer for the project.

**Chicago, Ill.**—Plans have been perfected for a merger of the Chicago Mill Paper Stock Company, 900 North Ogden avenue, and the Pioneer Paper Stock Company, 448 West Ohio street, and the two organizations will be operated in the future under the management of the Container Corporation of America, Inc., 111 West Washington street, which has heretofore controlled the first noted company through the Chicago Mill and Lumber Company. The new consolidated company plans a general expansion program for increase in present production and distributing facilities. J. V. Spachner, manager of the Chicago Mill Paper Stock Company, will become president of the Pioneer company; O. F. Sohm, one of the founders of the last noted organization, will retire from the business. A. U. Claghorn of the Chicago Mill Paper Stock Company, will become vice-president of the Pioneer company. It is understood that both of the present local plants will be maintained in service for the time being.

**Fort Edward, N. Y.**—The International Paper Company, New York, has recently completed the remodeling and improvement program at its local mill, to develop the plant for production of special bleached papers, and will arrange a capacity schedule on a basis of close to 130 tons of such stock per day, giving employment to full working force.

**Seattle, Wash.**—The Seattle Pulp and Paper Company, care of Shank, Belt & Fairbrook, 1002 Alaska Building, Seattle, attorneys, recently formed with a capital of $212,700, is said to be planning the operation of a pulp and paper mill in this section. The new company is headed by Arthur B. Langlie and F. R. Burr, both of Seattle.

**St. Johns, N. F.**—The International Power & Paper Company, a subsidiary of the International Paper Company, 100 East Forty-second street, New York, is reported to have preliminary plans under way for the construction of a new addition to its mill at Corner Brook, recently acquired, to develop the plant to a rating of 600 tons of news print per day. The company is also said to be arranging for the erection of a new news print mill in the Cander River pulp district. The projects are reported to cost more than $5,000,000.

**Donnacona, Que.**—The Donnacona Paper Company has approved plans for a new two-story machine unit at its plant, 40x40 feet, to be used for machine parts and repair work, estimated to cost about $30,000, with equipment.

**Toronto, Ont.**—Dominion Boxboards, Ltd., has awarded a general contract to the Toms Contracting Company, 245 St. Claire avenue, East, Toronto, for a proposed new one-story and basement plant unit, 65 x 140 ft., reported to cost close to $85,000. J. L. Carey, 208 North Laramie avenue, Chicago, Ill., is engineer.

### New Companies, Etc.

**Rochester, N. Y.**—Bunnell Photo, Inc., has been incorporated with capital of $25,000 and 250 shares of common stock, no par value, to manufacture photographic papers, films, etc. The incorporators are John Henderson and Clifford T. Bunnell. Representative: Macomber & Skivington, 511 Wilder Building, Rochester, attorneys.

**Chicago, Ill.**—The Illinois Paper Box Company, 1323 Carroll street, has arranged for an increase in capital from 1500 shares of stock, no par value, to 3000 shares no par value, with preferred stock capitalization remaining at $150,000 in addition.

**Woodbury, Conn.**—Woodbury Shops, Inc., has been incorporated with capital of $50,000, to manufacture and deal in paper boxes, etc. Incorporators: G. R. Sturges and De France Clark, both of Woodbury; and Albert Aston, Southbury, Conn.

**St. Louis, Mo.**—The St. Louis Paper Company, 204 South Eighth street, has filed notice of increase in capital from $50,000 to $200,000, for general expansion in operations.

**New York, N. Y.**—The Nassau Fibre Company has been incorporated with a capital of 200 shares of stock, no par value, to manufacture a line of fiber products. A. H. Frisch, 350 Madison avenue, New York, is principal incorporator and representative.

**St. Louis, Mo.**—The St. Louis Paper Company, 204 South Eighth street, has filed notice of increase in capital from $50,000 to $200,000, for general expansion in production and distribution.

**Albany, N. Y.**—The Yorkshire Corrugated Box Company, Albany, has filed notice of company dissolution under state laws.

**Boston, Mass.**—The B. & C. Fibre Development Corporation has been incorporated with a capital of $50,000, to manufacture and deal in fiber products. T. G. Booth, 215 Huntington avenue, Boston, is president, treasurer and representative.

**Georgetown, Del.**—The New Process Fibre Company, Georgetown, has arranged for an increase in capital to $60,000, for financing and expansion.

## U. S. Paper Bag Co. Formed

The United States Paper Bag Company, Inc., has been organized with offices and factory located at 505-515 Johnson avenue, Brooklyn, N. Y. The new company will specialize in glassine bags, white laid candy bags, millinery and notion bags, and kindred specialties, of which a full stock will be carried at all times to assure the jobbers of prompt service.

The principals, Louis Glickman, Morris Glickman, and M. D. Fox, are all men of long paper trade experience, and their entrance into this field was prompted by the ever increasing demand for these lines. The equipment is all of modern type, and the installation of additional units is under consideration which will make it one of the most complete plants of its kind in the country.

The marketing of the product is under the direction of C. W. Brelle, who has had long experience in this field. The slogan of the company is "Specialty Bags on a Main Line Basis."

## Montague Machine Co. To Broaden Field

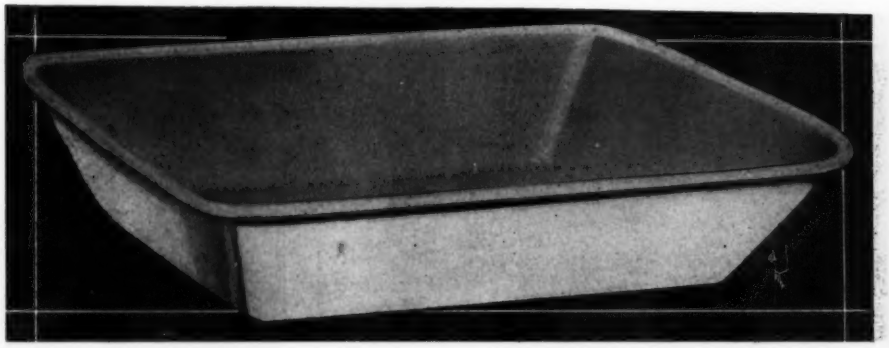
The Montague Machine Company, of Turners Falls, Mass., which for many years has been engaged in the manufacture of special types of pulp and paper mill equipment for the International Paper Company, recently decided to broaden its markets for its products among the users of its types of equipment in the pulp and paper mills. This company occupies a unique position, as its products are now very extensively used in the various plants of the International Paper Company whereby the company has been enabled to obtain information of value to the industries as a whole, especially in view of the research work which is being carried on by the parent company. The company has already obtained a number of installations of its grinders and special lines of machinery which it is now in position to manufacture on a large scale.

# "PAPRUS"
## BUTTER, LARD OR FOOD DISHES

WATERPROOF — DO NOT LEAK

*Used by Butchers—Grocers—Delicatessen Stores*

500 in Dust Proof Shipping Case



JOBBERS' STOCKS GUARANTEED AGAINST DECLINE

*According to Keyes Guarantee*

GOODS THAT SELL

STAPLE AS SUGAR IN A GROCERY STORE

*BETTER QUALITY — BETTER SERVICE — BEST VALUE*

# KEYES FIBRE COMPANY, Inc.

JOHN M. HART COMPANY, Manager of Sales

*General Sales Offices,* GRAYBAR BUILDING, NEW YORK, At Grand Central Terminal

Ground Wood Mill
SHAWMUT, ME.

Factory
WATERVILLE, ME.

# Retire from Continental Paper and Bag Mills

## Herman Elsas, President and General Manager, and I. Kuhe, Vice President and Sales Manager of the Corporation and Its Subsidiary Companies Resign from Active Service in the Companies After Being Associated With Them for a Period of Almost Thirty Years

Herman Elsas, president and general manager, and I. Kuhe, vice-president and sales manager of the Continental Paper and Bag Mills corporation and its subsidiary companies, resigned from active service in these companies last month. I. Kuhe also resigned as president of the Victory Bag and Paper Company.

The predecessor of the present Continental Company, the Continental Paper Bag Company was organized on May 23, 1899, by the late Hugh J. Chisholm and Herman Elsas, on the basis of a number of valuable bag machine patents owned by Herman Elsas and an alliance formed with the International Paper Company. Herman Elsas was elected president and general manager and I. Kuhe, secretary. Operations at Rumford were begun in 1900 and a large bag plant equipped adjoining the International Paper Company's Paper mill. Shortly afterwards I. Kuhe was elected vice-president in charge of sales.

HERMAN ELSAS

I. KUHE

Under the able management of these men, the company achieved, in a surprisingly short time, a leading position in its field.

In the years following, various paper mills in strategic positions were acquired, giving Continental, with a capacity in excess of 500 tons of paper products daily, a dominant position among manufacturers of wrappings, bags, bag specialties and tissue products.

Due to progressive merchandising methods, Continental lines are today favorably known throughout the length and breadth of this country and in Canada.

The retiring officers leave to their successors in the management, a business of between 19 and 20 million dollars annually and an excellent organization which enjoys the good will of the trade to an exceptional degree.

Both men have taken a prominent part in association work and served on the Executive Council of the American Paper and Pulp Association.

A host of friends will regret the retirement of Herman Elsas and I. Kuhe from the enterprises with which their names have been synonymous from the beginning.

I. Kuhe is understood to plan a trip abroad next month for a well deserved rest. It is to be hoped that upon his return he will reenter the field in which he is so well known. He has located an office at 11 West 42nd street, New York.

### Kalamazoo Parrafin Co. Builds Addition

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., April 16, 1928.—The Kalamazoo Paraffin Company, 1819 Reed street, is erecting an addition to its factory structure, which is 20 by 80 feet in dimensions. It is being built by the Stefco Steel Company and is strictly fireproof. The materials used are the steel frame work, sheet steel siding and concrete floors and foundations. The concern will also install considerable new equipment, expending about $7,000 for those items.

This concern, which suffered quite a setback as result of a disastrous fire, is now in the clear and operating successfully and profitably. According to M. A. Macomber, president, the output has been increased from 8,000 pounds to 24,000 pounds daily of high grade wax and the entire product is sold for a year ahead. A large property site at Reed and Fulford streets is owned and will make it possible to more than double the present capacity.

About 75 per cent of the company's product is sold in the Kalamazoo valley. The balance fills other large orders in the middle west.

### Changing Over Lyman Mills to Make Paper

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., April 16, 1928.—The Whiting Paper Company is progressing rapidly on the changing over of the Lyman Mills recently purchased by it for manufacturing paper. The contractors are working in one building making the necessary changes and the contracts have been let for the large majority of the equipment, including four motor driven web super calenders from the Norwood Engineering Company of Florence, Mass. The order has also been placed with the Norwood Engineering Company for a three million gallon gravity filter plant of the latest type.

**Jeffrey Chains for Every Service**

Jeffrey Reliance Chain for drives, elevators and conveyors moving pulp mill materials.

# Unheeded but Hard at Work

In a dark pit under the boiler house this Jeffrey Single Roll Crusher is doing a hard job and asking no help.

It is receiving lump coal from a Jeffrey Plate Feeder and reducing it in a single operation to stoker size. The crushed coal is delivered to the Jeffrey Steel Apron Conveyor.

Jeffrey Reliance Chains drive both the plate feeder and the steel apron conveyor from sprockets on the roll shaft.

The Jeffrey Single Roll Crusher has long teeth to grip the coal and pull it against the breaker plate where short teeth crush it. The breaker plate can be adjusted to give several degrees of fineness to the coal.

## The Jeffrey Manufacturing Company

931-99 North Fourth St., Columbus, Ohio

New York, Buffalo, Chicago, Charleston, W. Va. — Rochester, N.Y., Philadelphia, Milwaukee, St. Louis — Pittsburgh, Scranton, Pa., Denver, Salt Lake City — Boston, Cincinnati, Los Angeles, Birmingham — Cleveland, Detroit, Montreal, Houston, Tex.

51 YEARS OF SERVICE TO INDUSTRY

# JEFFREY

MATERIAL HANDLING EQUIPMENT

Jeffrey Products

Elevators
Conveyors
Portable Loaders
Coal and Ashes Handling Equipment
Kip Hoists
Chains and Attachments
Sprocket Wheels—Gears
Crushers—Pulverizers
Sand and Gravel Handling, Washing and Screening Equipment
Locomotives
Coal Mine Equipment
Tipple Equipment
Ventilation Fans

# New York Trade Jottings

W. F. Goldsmith, of Arthur D. Little, Inc., Cambridge, Mass., was a New York visitor last week.

* * *

Professor Harold Hibbert, of McGill University, sailed from New York last week for Europe, where he plans a five months stay.

* * *

The Binders Board Manufacturers Association is scheduled to meet on Friday, April 27, at Springfield, Mass.

* * *

A. A. Steinfeld, associated with M. M. Cohen in the paper and twine business, is now located at 337-341 West 16th street, New York.

* * *

A. E. McMaster, general manager of the Powell River Company, Ltd., Vancouver, B. C., was in New York last week in the interest of his organization.

* * *

The St. Regis Paper Company have removed their general sales offices from 49 Wall street to 15 Broad street, New York, the new building of the Equitable Trust Company.

* * *

The executive committee of the American Paper and Pulp Association is to meet in the Board Room at headquarters, 18 East 41st street, New York, on Saturday, May 12.

* * *

Maurice Hoops, president of Finch, Pruyn & Co., Inc., Glens Falls, N. Y., was in New York early this week on his way home after spending an enjoyable vacation in the Sunny South.

* * *

L. J. Paraut, general manager of the St. Croix Paper Company, was in New York last week after spending the past two months in travel. Mr. Paraut visited California, via. the Panama Canal.

* * *

Salvage from the stock of the Roberts-Boice Paper Company, of Poughkeepsie, N. Y., was disposed of by the Underwriters Salvage Company of New York at 537-549 Broome street, last Friday.

* * *

George Carter and E. O. Reed, of the Government Printing Office, were guests last week of the A. S. M. E., and addressed a meeting in New York of the Printing and Management Divisions.

* * *

The governing committee of the New York Stock Exchange have admitted to listing 285,000 additional shares of common stock without nominal or par value of the Abitibi Power and Paper Company, Ltd.

* * *

R. S. Kellogg, secretary of the News Print Service Bureau, and his son, Clifford, have returned to New York after a ten days automobile trip through the western section of North Carolina and the eastern section of Tennessee.

* * *

Frank L. Floyd, secretary of the National Paper Trade Association, gave an interesting and instructiive talk on co-operation between the various associations of the paper industry at the regular weekly luncheon of the New York Division of the Salesmens' Association of the Paper Industry, held at the Canadian Club last Monday. An excellent attendance thoroughly enjoyed Mr. Floyd's pertinent remarks.

* * *

The Monagas Trading Company, 110 East 42nd street, New York, announces that it has acquired the goodwill of the Parsons Trading Company, of New York, including their brands and labels, as well as the universally known trade-mark "Caravel," registered in all important export markets. The Monagas Trading Company has retained the former trade connections, here and abroad, and is in position to quote the same advantageous prices and maintain the same high standard of quality as their predecessors.

* * *

Fred L. Schenk, formerly with C. B. Hewitt Bros., has recently assumed charge of the Board and Specialties Department of the Walker Goulard Plehn Company, mill distributors of paper, of 448-450 Pearl street, New York. Mr. Schenk has had an extensive experience of more than twenty-five years in selling pattern papers, rope specialties and boards. The Walker Goulard Plehn Company are the successors of the old firm of Maurice O'Meara Company.

* * *

Paul S. Hanway, secretary of the American Waxed Paper Association, is cooperating with the luncheon committee of the New York Division of the Salesmen's Association in arranging the program for the luncheon on Monday, April 23, at which waxed papers will be the featured grade. This program will offer an interesting change from the previous "Special Grade" luncheons because of the difference in the methods of distributing waxed papers. The paper merchant is not a heavy customer for this grade, most sales in large volume being made direct to consumers. Due to this fact no merchants will be invited to the April 23 luncheon but the problems of merchandising will be covered in another way. Salesmen of papers for waxing will find this luncheon of particular interest because of the opportunity it will give them to learn at first hand some of the problems of their customers.

## James Campbell Sheers Dead

NIAGARA FALLS, N. Y., April 16, 1928.—James Campbell Sheers, Secretary and Works Manager of the Defiance Paper Company and Niagara Wall Paper Company of Niagara Falls, and Treasurer of the Pittsburgh Wall Paper Company at New Brighton, Pa., passed away on Monday afternoon, April 2, at the age of 30 years. The funeral services were held from his late residence in Niagara Falls, N. Y., on Wednesday, April 4, and his body was taken to his former home in Pittsburgh for burial.

Mr. Sheers had been connected with the above companies for about ten years and had been in charge of the Pittsburgh Wall Paper Company at New Brighton, Pa., for a number of years before coming to Niagara Falls, N. Y., about a year and a half ago.

He was highly respected by all his associates and his passing will be keenly felt by the people with whom he worked.

## Westinghouse To Handle Nuttall Business

PITTSBURGH, Pa., April 16, 1928.—As of April 1, 1928, the R. D. Nuttall Company's commercial activities will be handled by and through the parent company, the Westinghouse Electric and Manufacturing Company.

All inquiries, etc., should be addressed to the nearest Westinghouse District Office.

J. E. Mullen, formerly Assistant Sales Manager of the R. D. Nuttall Company, will head up the new commercial setup with offices at the Nuttall Plant, McCandless avenue at Butler street, Pittsburgh.

## A Correction

In the article entitled "Making Pulp from Sugar Cane by New Process" in the issue of the PAPER TRADE JOURNAL of March 29, the sentence under the sub-caption "Long and Strong Cells" on page 23 reading "the folding strength is likewise very high and the tensile strength of 150 reflects the presence of unusually long and strong fibers characteristic of this pulp" should have read "the folding strength is likewise very high and the *tearing* strength of 150 reflects the presence of the unusually long and strong fibers characteristic of this pulp."

RYTHER AND PRINGLE COMPANY
CARTHAGE, N.Y.

# RYTHER CABLE CONVEYORS

**RYTHER CABLE CONVEYORS are constructed to carry either two foot or four foot pulpwood. The construction can be of timber or structural steel. The machine parts are extra heavy and designed for maximum capacities. The standard design is flexible and can be combined to meet all storage and reclaiming conditions.**

FOR CANADA REFER

CANADIAN INGERSOLL-RAND COMPANY, LIMITED
10 PHILLIPS SQUARE, MONTREAL, P. Q.

# Power Plant Section

## Reducing Power Costs Through Unit Treatment

Conducted by REGINALD TRAUTSCHOLD, Consulting Engineer

# Modernizing the Mill and Power Plant

### Stoker Applications

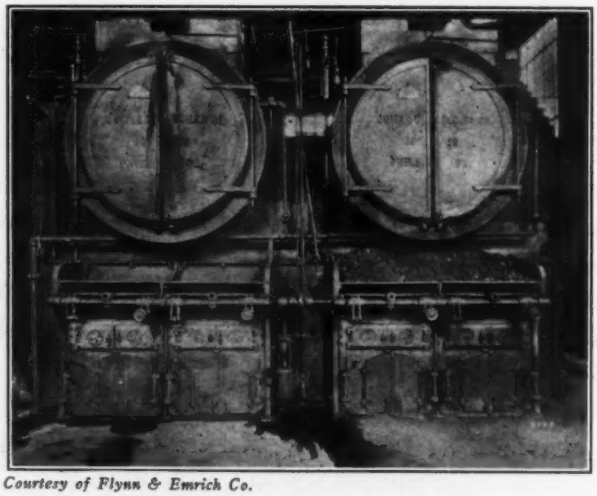
In an industry in which such vast quantities of steam are employed for process operations and power as in that of pulp and paper making, the problem of effecting the cheapest way of firing the steam boilers looms big and commands consideration at all times. If the fuel is coal, as it is in the great majority of instances, the modern mill of considerable capacity turns, naturally, to an investigation of the various makes of automatic stokers which might be employed and may look into the possibilities of using pulverized coal as boiler fuel. The mill of lesser size, but still a very respectable producer in volume of output, may still be hesitating about the advisability of installing automatic stokers on the ground of the considerable investment entailed. Then there are the still smaller mills, those with, say, less than 50,000 pound 24-hour output, which feel that the initial cost of stokers prohibits their installation.

To each of these three divisions, the subject of stoker firing is of interest, of vital importance to those mills which cannot afford not to use stokers, of moment to those mills which can properly give the possible installation of automatic stokers consideration and of interest even to the smallest mills which would like to install automatic stokers if they could see that the investment was warranted. The first class, those mills which cannot afford not to employ automatic stokers, includes probably 30 per cent of all the pulp and paper mills of the country; the second class, perhaps, 20 to 25 per cent of the mills; and the class which feels that the initial expense is too great, from 45 to 50 per cent of all the pulp and paper mills in the United States.

In the discussion, "Profitable Stoker Installations," which appeared in these columns in the issue of November 10, 1927, the applications cited and the presentation of the subject, though couched in quite general terms, were such as to focus attention upon stoker applications in the larger power plants, operated by those mills most familiar at the present time with the advantages of automatic stoker firing. The present discussion will treat, therefore, more with the problems of the mills still undecided as to the advisability of modernizing their power plants by the installations of stokers, particularly those of medium and small size.

The situation in respect to the power plant of the big mills, in fact, is rapidly approaching that of the electric public utilities, the electric light and power companies, where it is no longer a question of considering simply a stoker installation, but of adopting the more recent refinements and developments incorporated in the latest approved furnace designs and systems of preheated air supply aimed to increase further the economy and high efficiency of proper stoker furnace operation. This trend is in the direction of more intensive applications of water cooled furnace walls, of water cooled arches for chain grate stokers, of preheating the air supply for combustion to high temperatures and of overfire air injections for both chain grate and underfeed stokers. The discussion of these questions, however, had better be deferred to a latter date, or until such practices have become more standardized and the need for such refinements more generally felt throughout the pulp and paper industry.

The time when such discussions will be pertinent may not be so far distant, however, for during recent months there has been considerable activity among the more progressive paper mills to bring their stoker equipment up to present day standards of efficiency. Stoker installations which were considered good only a few years ago are being replaced by more advanced systems and with decided benefit to the mills. One of the more progressive of the Canadian mills, for instance, is negotiating at the present time for the remodeling of its quite extensive stoker installation, the new installation to cost in the neighborhood of $65,000. However, the estimated and anticipated economies to be realized from such modernizing of the power plant, is a matter, in coal saving alone, of about $42,000 per annum, so the necessary outlay would appear a very modest one indeed. The savings, furthermore, are based upon economies over previous stoker practice, which has been considerably more economical than any results which could have been secured with hand firing. This gives some idea of the real necessity of highly perfected modern automatic stokers to the mill which can see its way clear to making the required investment.

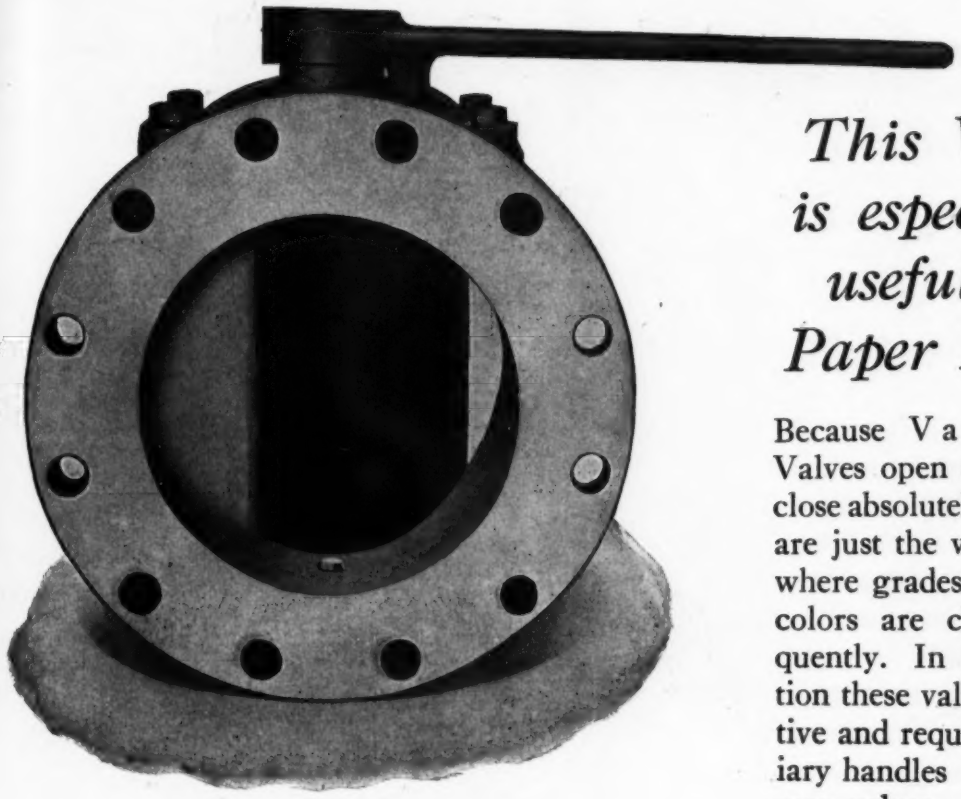


*Courtesy of Flynn & Emrich Co.*

TWO OF THE FOUR SEMI-AUTOMATIC STOKERS WHICH SAVE $15,000 PER YEAR

The time when such investment is not only warranted, but called for, is governed in large measure by two considerations which are constanly assuming greater weight, the price of coal and the cost of boiler house labor. The latter consideration continues to be the dominant one, doubtless, but the former can no longer be disregarded, being the governing consideration, as a rule, in the

# Where Stock is Changed Frequently



## *This Valve is especially useful in Paper Mills*

Because Valley Plug Valves open quickly and close absolutely tight, they are just the valves to use where grades of stock or colors are changed frequently. In their operation these valves are positive and require no auxiliary handles as do common valves.

This use is only one of the many uses Valley Plug Valves are put to in paper mills. For positions difficult to reach, where minimum space only can be allowed for the valves, for angle positions, Valley Plug Valves perform equally well. Their performance is not hindered by their position. Unusual use has made them popular.

In construction they are simple—made without ledges, gates or sharp corners—operating on a rotating principle.

If you have not investigated these valves before, let us send you our special booklet on valves. Your request will bring you a copy.

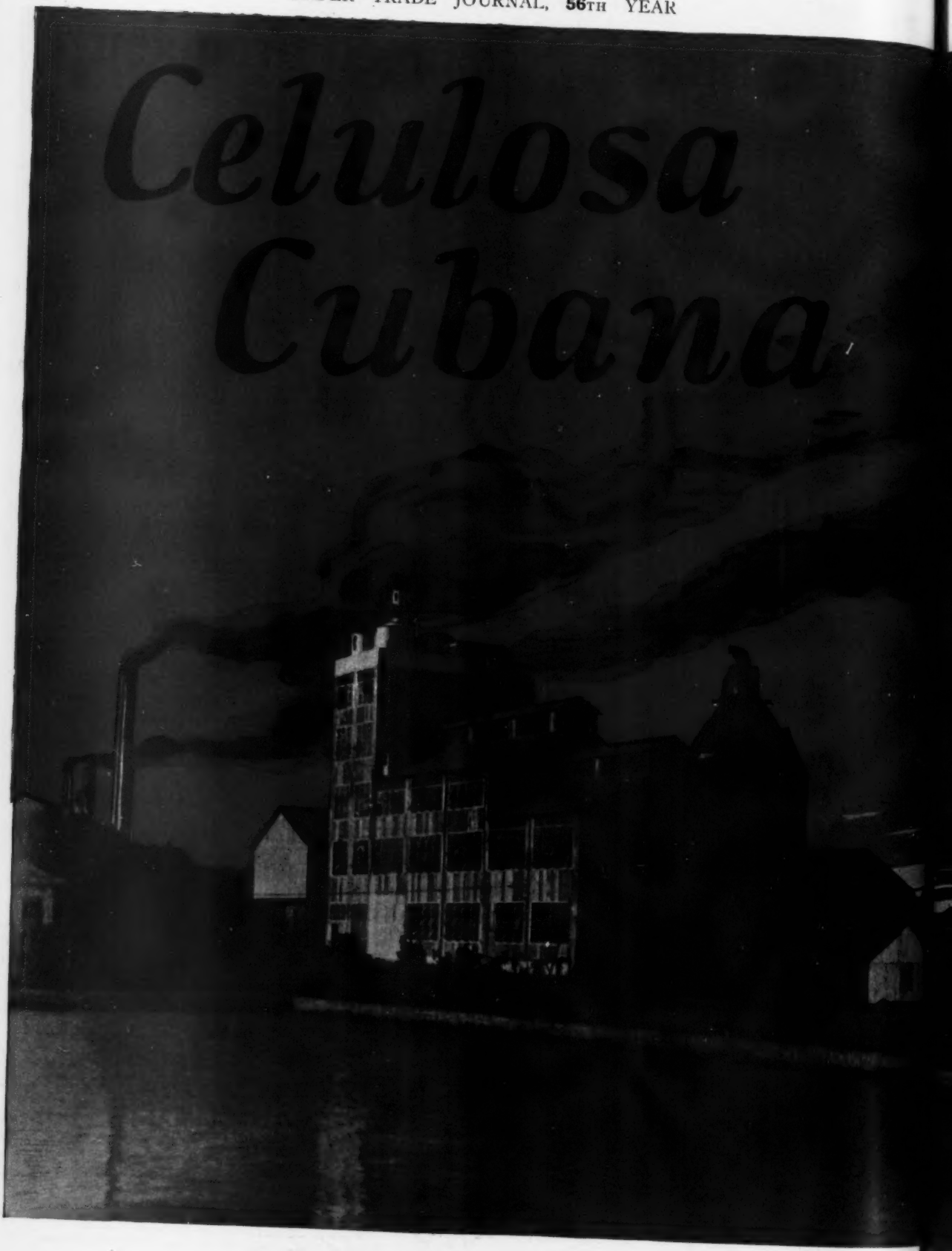
**VALLEY IRON WORKS CO.**

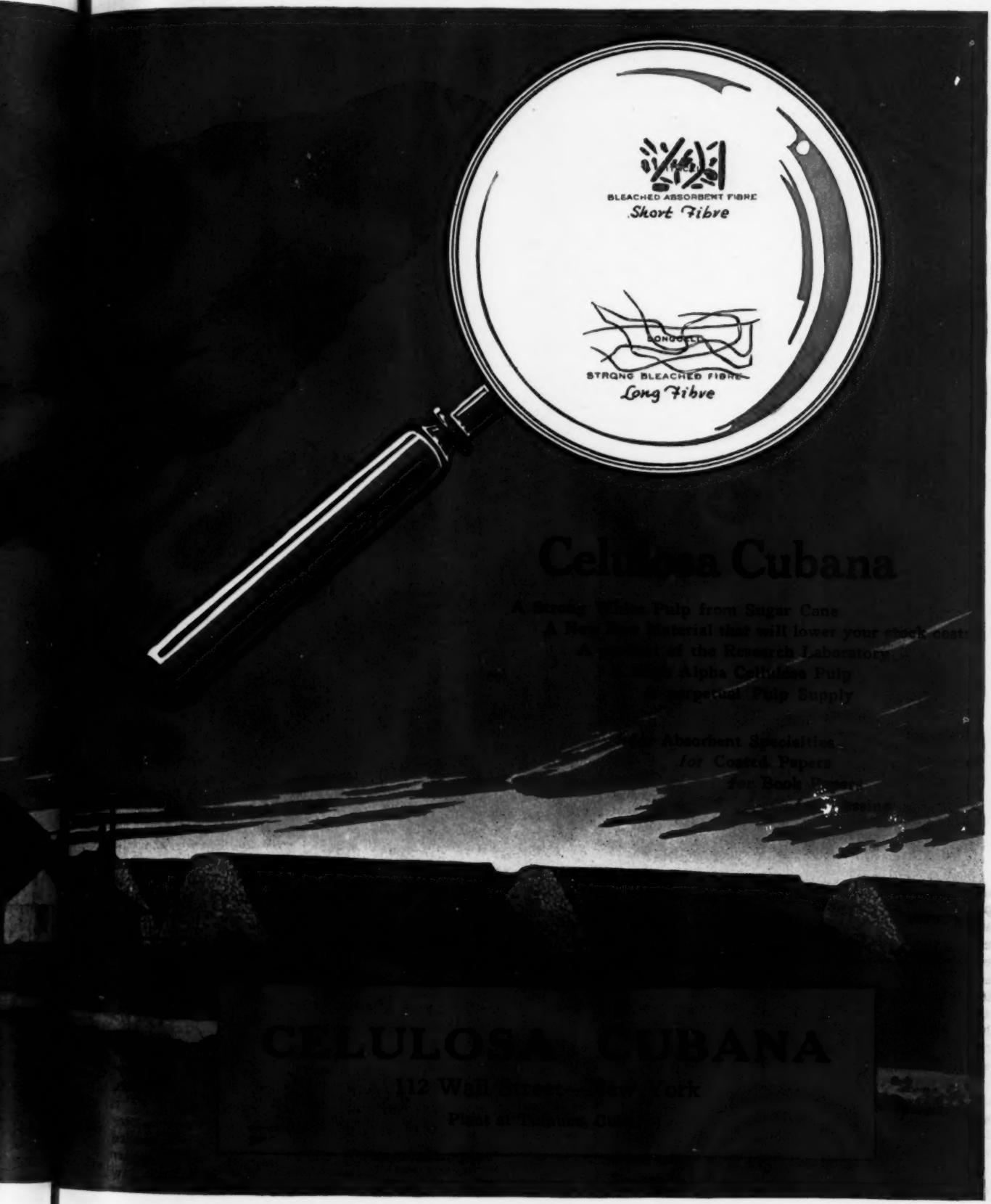
*Machinery for Paper and Pulp Mills*

**APPLETON WISCONSIN**

*New York Office: 350 Madison Avenue*

*Western Manufacturing & Sales Division: Smith & Valley Iron Works Co., Portland, Oregon*


Celulosa
Cubana


BLEACHED ABSORBENT FIBRE
Short Fibre
STRONG BLEACHED FIBRE
Long Fibre
Celulosa Cubana
A Strong White Pulp from Sugar Cane
Alpha Cellulose Pulp
for Coated Papers
CELULOSA CUBANA

modernizing or improving of an existing stoker installation.

Linking the consumption of coal and the expense for boiler labor together, in a fashion, it is generally conceded that the installation of automatic stokers in a plant consuming less than about 50 tons of coal a week will effect no saving in labor expense; in one consuming 100 tons, rather less than 10 per cent; 200 tons, about 30 per cent; 300 tons, 40 per cent; and so on. These computations are, of course, only rough estimates, but they are, nevertheless, quite indicative and establish, at least, a time when consideration should be given to the installation of automatic stokers.

For an automatic stoker installation to be fully justified on the grounds of reduced boiler labor expense, a battery of six or eight boilers of at least 1,500 to 2,000 aggregate horsepower has usually been considered necessary, and that both coal and ashes be handled mechanically. A 2,000 horsepower battery of boilers operated under the conditions usually pertaining in the paper mill power plant would consume in the neighborhood of 250 tons of coal a week, or somewhat more, requiring a crew of at least three men. Under such circumstances, a saving in labor expense of about 33 per cent (one man) might be expected, thus providing another index of when to install a system of automatic stoker firing. Namely, when a third of the boiler room payroll would suffice to carry the investment burden of such a stoker installation. As a considerable saving in fuel consumption would also result from such an approved installation, however, an investment in a suitable automatic stoker system for a boiler plant of as low as 1,500 horsepower boiler capacity should prove, not only well warranted, but quite profitable. As the price of coal advances, furthermore, even smaller plants can well afford the automatic stoker installation, so perhaps the line may even now be placed at about 1,000 horsepower.

### When To Install Semi-Automatic Stokers

There are, however, many more mills with boiler plants aggregating less than 1,000 horsepower boiler capacity than there are mills operating batteries of boilers of such capacity and larger. These may be further divided into the mills with boiler plants of from 400 to 1,000 horsepower rating and those with more limited boiler capacity. Together, these mills represent about 70 per cent of the paper mills of the country and about a third of this number, 20 or 25 per cent of all the mills in the country, are those with boiler capacities of between 400 and 1,000 horsepower. For these, the suitable and proper stoker installation might appear to be one composed of the excellent semi-automatic stokers now on the market.

In the discussion on stoker installations in the issue last November, the installation cited which yielded the heaviest return on the investment entailed was that at the Sutherland Paper Company. Here, five semi-mechanical (semi-automatic) stokers effect savings in fuel consumption and boiler labor expenses in the operation of the 750 horsepower boiler battery they serve, which are equivalent to an annual return on investment of 182 per cent. The savings include a reduction in coal expenses of $9,000 a year and in boiler labor of $2,592. In another installation of semi-automatic stokers, four units serving a battery of about 700 horsepower boiler capacity and made within the past five years, a saving in coal alone of 3,000 tons a year is realized, when the mill is operated at normal capacity. In this instance, the coal commands a price of around $5 a ton, so the yearly saving under normal conditions is for this one item $15,000. The outlay entailed for the stokers called for an investment of $7,200, so the yield in this case is somewhat better than 208 per cent a year, a return very much in the class with that realized at the Sutherland Paper Company.

In both these instances, which are quite typical, the stokers effected a 25 or 30 per cent saving in fuel consumption, as compared with results when depending upon hand firing, which at the prices of coal at the respective localities well sufficed to cover the cost of the stokers within the year. On such count alone, the installation of semi-automatic stokers, the operation and main constructional details of which were described in a general way in the previous stoker discussion,[1] is fully justified in boiler plants of from 400 to 1,000 horsepower boiler capacity, even though an investment in fully automatic stokers may impose, as many mills doubtless feel, an unduly heavy burden. The semi-automatic stokers in the two installations cited cost, in one case about $1,200 and in the other about $1,800 per unit.

This analysis of semi-automatic stoker installations in paper mill service has been presented in order to establish some logical and proper field for such devices and to show the part they can play in modernizing many of the 20 to 25 per cent of paper mill steam plants at present handicapped with unnecessarily heavy steam costs. A burden imposed by sticking to hand firing of boilers in the belief that the marked advantages of automatic stoker firing enjoyed by the paper mills with larger power plants cannot be afforded. There remain, however, the very large number of mill plants with boiler batteries of 400 horsepower or less, probably half the paper mills in the country, which feel that even the installations of semi-automatic stoker firing systems are beyond their means. For these, the hand operated stokers may provide a means of modernizing their boiler plants, not that such stoker installations are much or any cheaper than those of semi-automatic units, but for the inherent advantages of stoker firing, as compared to hand firing.

### Hand-Operated Stoker Characteristics

The hand-operated stokers, like the semi-automatic units which have already been described, are for the most part of the overfeed type, the inherent advantage of which is that such stokers are eminently suitable on which to burn coals of the caking class. The fires carried are comparatively thin, making the advancement of the fuel down the inclined stoker grates by hand actuated pusher grate sections a simple and easily performed operation, the powerful leverage of the operating handles being transmitted to the pushers through toggle connections. The pushers, as they rise and fall in advancing the fuel bed, also act to keep the bed well broken up, so circumventing the caking which would otherwise occur with many coals.

The green fuel, fired by hand, is partially coked on the front upper sections of the stokers, at which position the supply of air for combustion is somewhat restricted for the coking process, and the lighter volatile gases driven off in the process pass over the lower incandescent portions of the fires and are thus completely consumed. When the coking has progressed sufficiently, the fuel freed of its lighter gases is advanced further along the stoker, where the heavier gases are driven off and consumed and finally the coke, while additional green fuel is fed to the upper sections for repetition of the preliminary coking process. As the combustion of the fuel progresses, it is advanced further and further along the stoker, until at the bottom it has been completely consumed and the final ashes are dumped or pushed into the ash pit.

Holes in the fire are effectively prevented in this method of advancing the fuel bed, as the preliminary coking takes place before there has been any disturbance of the fuel, while it rests on a grate section with small openings, narrow slots or holes, only large enough to permit the passage of the restricted air supply for insuring partial combustion of fuel, i.e., coking. These small openings also serve to guard against the loss of small pieces of green fuel before they have been fused to the lumps of fuel which form the coke handled by the lower sections of the stokers by the preliminary coking process. Fuel of almost any kind can be handled by these little stokers, all grades of bituminous coal, no matter how poor, coke breeze, lignite, mixtures of refuse, tan bark, saw mill debris, bagasse, "hog fuel," etc., and consumed with virtually no smoke.

[1] Paper Trade Jour., Nov. 10, 1927, pp. 46-48.

# G-E Sectional Drive

Repeat orders tell the story.

The sectional drive shown above is installed at the Everett Pulp and Paper Company, Everett, Wash. The Everett Company got such good performance out of this drive that it ordered two more to change over existing machines.

The following are repeat orders for the past three years:

| | | |
|---|---|---|
| 1925: | Canadian International Paper Co. | 4 |
| | Tonawanda Paper Co. | 1 |
| 1926: | Oregon Pulp and Paper Co. | 3 |
| | Canadian International Paper Co. | 4 |
| | Everett Pulp & Paper Co. | 2 |
| 1927: | Great Northern Paper Co. | 1 |
| | Warren Manufacturing Co. | 1 |

The entire continent puts confidence in G-E Sectional drive.

Apply the proper G-E Motor and the correct G-E Controller to a specific task, following the recommendations of G-E specialists in electric drive, and you have G-E Motorized Power. "Built in" or otherwise connected to all types of industrial machines, G-E Motorized Power provides lasting assurance that you have purchased the best.

GE Motorized Power
*—fitted to every need*

237-15

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

These hand-operated stokers save little labor expense, obviously, except that in boiler and furnace maintenance realized by virtue of the much more complete and efficient combustion than can be secured in an ordinary hand fired furnace. Their chief value lies in that very much cheaper fuels can be burned, almost anything which will burn. This one advantage suffices to make their installation well warranted from a money saving point of view, provided, of course, that cheaper fuel than can be successfully burned in the ordinary hand fired boiler furnace is available.

An excellent idea of what savings can be effected by these little hand-operated stokers can be gathered from the experience of a steam laundry which installed such a stoker to avoid the smoke nuisance incident to its hand firing practice, rather than with any idea of cutting steam costs. The demands for steam at this establishment are very similar to those pertaining in the small paper mill, so the selection of an installation without the industry, for the reason that it supplies detailed cost figures and expenses which are probably more dependable than those maintained by most concerns operating small boiler plants within the industry, is permissible.

The boiler battery consists of one 250 horsepower unit, normally operated at 100 pounds pressure and almost constantly at considerably over rating, the summer load averaging 300 to 350 boiler horsepower and the winter load 400, with wide variations in steam demand. The hand-operated stoker, incidentally, carries the fluctuations in steam requirements easily, the green fuel being subjected to the preliminary coking process serving as a sufficient reserve for meeting all sudden demands. The abatement of the smoke nuisance is realized, since combustion is greatly improved, as evidenced by the fact that the average $CO_2$ content of the flue gases has increased by somewhat over 3 per cent since the installation of the stoker. This, furthermore, in spite of the fact that a much cheaper fuel is in use than was formerly employed.

The itemized savings realized, at least those which have been accounted for, are: $172 a year, due to the fact that the soot has to be blown only half as frequently as before the installation of the stoker; $309 yearly in reduced boiler room upkeep, credited to the fact that the services of the man in charge are now available for other important work an hour and a half each day; and an annual saving in the coal bill of $2,160.60; making the total recorded gross savings $2,641.60 per annum. The stoker, together with its installation and various expenses contracted for a number of changes to the furnace and the breeching for the accommodation of the stoker, entailed a total investment of some $1,800. The carrying charges and suitable allowances for yearly repairs, depreciation and other expenses incidental to the operation of the stoker, all generously provided for, make a total yearly operating charge of $458.94. Deducting this from the gross savings, places the net annual savings at $2,182.66. This figure represents a yearly yield of 121 per cent on the investment, a return very much in line with those which have become associated quite generally with modern stoker installations, large or small.

In this sketchy review of the part which available modern stoker equipment can readily play in modernizing the paper mill power plant, in the way of substantially cutting production costs, an arbitrary division of paper mill power plants has been made, in order to point out logical fields for the three general varieties of stokers: automatic stokers, semi-automatic, or semi-mechanical stokers, and hand-operated stokers. In fact, there is no sharp line of demarcation between these divisions, at the boiler battery capacities suggested or at any other. The manufacturer of automatic stokers will be apt to claim that he can install stokers for caring for less than 1,000 horsepower boiler capacity, which will prove economical. Undoubtedly, he can. The maker of semi-automatic stokers, likewise, will claim that his equipment can handle with economy more than 1,000 and less than 400 horsepower boiler installations. He also is right, as is the builder of hand-operated stokers who claims that his units are adaptable to installations serving more than 400 horsepower of boiler capacity. They are all right. The point it was desired to make is that there are available today stoker equipment systems suitable and essential for the largest steam plant serving the pulp and paper industry and stoker equipments suitable and really essential to the smallest steam plant.

Every coal operated paper mill boiler plant aiming to generate steam at minimum expense, every paper mill striving to conduct a profitable modern business, should give careful thought to its present practices in boiler operation. There is no other investment in connection with a steam plant which will pay better than the amount entailed to secure good modern boiler practice.

## Black River Paper Mills Handicapped by Floods

[FROM OUR REGULAR CORRESPONDENT]

ALBANY, N. Y., April 16, 1928—The pulp and paper industry of the Upper Hudson Valley and Northern New York is being badly handicapped by the high waters which in many sections during the past week approached flood proportions. Reports from the Black River section tell of a general suspension of operations with most of the mills facing a prospect of several days idleness.

Along the Upper Hudson the situation was not so bad but the river was unusually high and mills are apprehensive of a further warm spell as there is still much snow in the mountains. On the Schroon River high water has caused considerable trouble with the Schroon River Pulp and Paper Company and other mills being unable to operate their water power plants.

Flood conditions on the Black River are described as the worst in many years with several of the larger plants partly under water. At Brownsville on Monday the water was reported to be above the windows on the first floor of the Brownsville Paper Company. The force of the onrushing water forced in many windows of mills along the Black River. At the mill of the Sherman Paper Company at Felt Mills it was necessary to barricade doors to prevent the flood from entering the mill. Extra precautions were taken at the Watertown mill of Taggart Brothers Company where the water was seeping through into the basement. At the plant of the West End Paper Company in Carthage the water was reported only a few inches from the top of the wall protecting the mill.

All mills in the Black River district excepting those with auxiliary steam power plants are closed and will be forced to remain idle until the water recedes sufficiently to allow operation of water wheels.

## E. J. McDonnell to Manage Groveton Mill

Of general interest to the paper industry is the announcement which has just been made of the resignation, effective May 1, of Edward J. McDonnell as general superintendent of the Albion and Crocker Divisions of the American Writing Paper Company, Inc., Holyoke, Mass.

Mr. McDonnell on May 1 assumes a new connection as general manager of the Groveton Paper Company, at Groveton, New Hampshire.

He is recognized as one of the leading producers of high grade papers, having been superintendent of the Tileston and Hollingsworth mill at Boston, Mass., for eleven years. During the past three years he has been associated with the American Writing Paper Company.

## Warren Mfg. Co. Installs Record Size Machines

[FROM OUR REGULAR CORRESPONDENT]

MILFORD, N. J., April 16, 1928.—The Warren Manufacturing Company has recently placed its order for the second 72 inch, 16 roll, glassine super calender, together with a 147 inch dampening machine with the Norwood Engineering Company of Florence, Mass. These machines are the largest machines of this type that have ever been built.

# Fulton
## Dryer Drainage Systems

### Definite Assurance—

**that the installation of a FULTON DRYER DRAINAGE SYSTEM will positively—**

**INCREASE MILL PRODUCTION**
**MATERIALLY IMPROVE THE SHEET**
**REDUCE STEAM COSTS TO A MINIMUM**

### The Guarantee

**"We guarantee maximum steam temperature in the paper machine dryers at all times, and no water present at any time."**

**FULTON SYSTEMS**

*a big Success in well onto 200 Mills producing*

ASBESTOS BOARD
BOND
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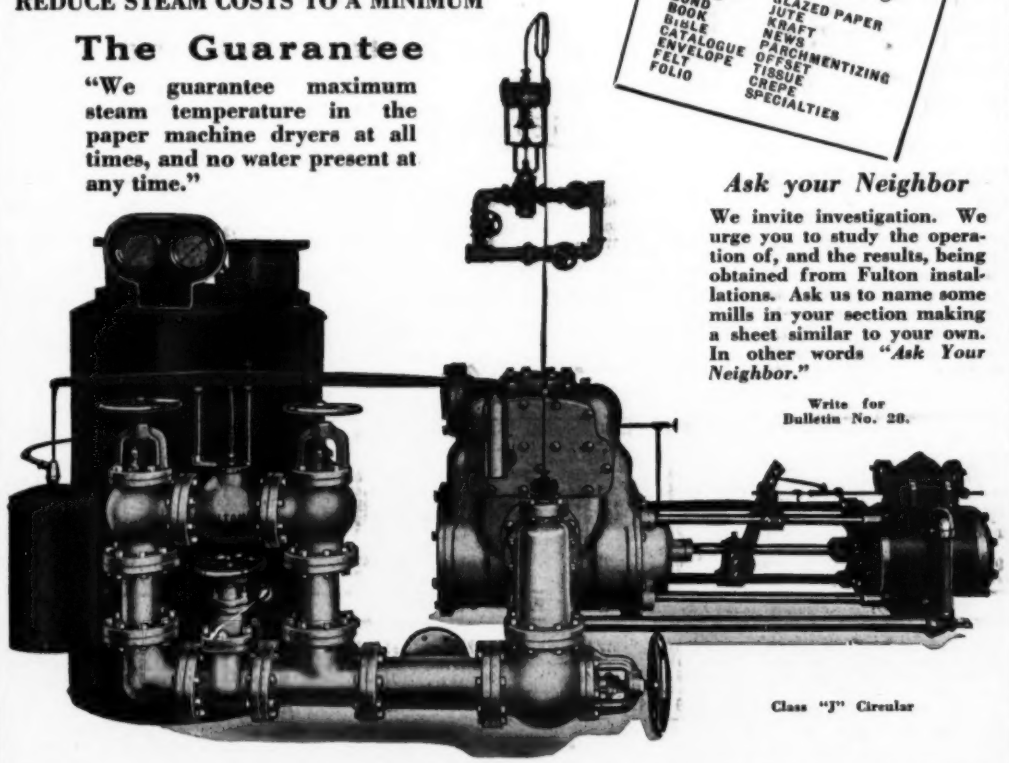
PARCHMENTIZING
OFFSET
TISSUE
CREPE
SPECIALTIES



### *Ask your Neighbor*

**We invite investigation. We urge you to study the operation of, and the results, being obtained from Fulton installations. Ask us to name some mills in your section making a sheet similar to your own. In other words *"Ask Your Neighbor."***

**Write for Bulletin No. 28.**

**Class "J" Circular**

# FULTON ENGINEERING CO.
## MIDDLETOWN, OHIO, U.S.A.

***Western Rep.*** **WOODBURY & WHEELER CO.**
**55 SECOND ST.** **PORTLAND, OREGON**

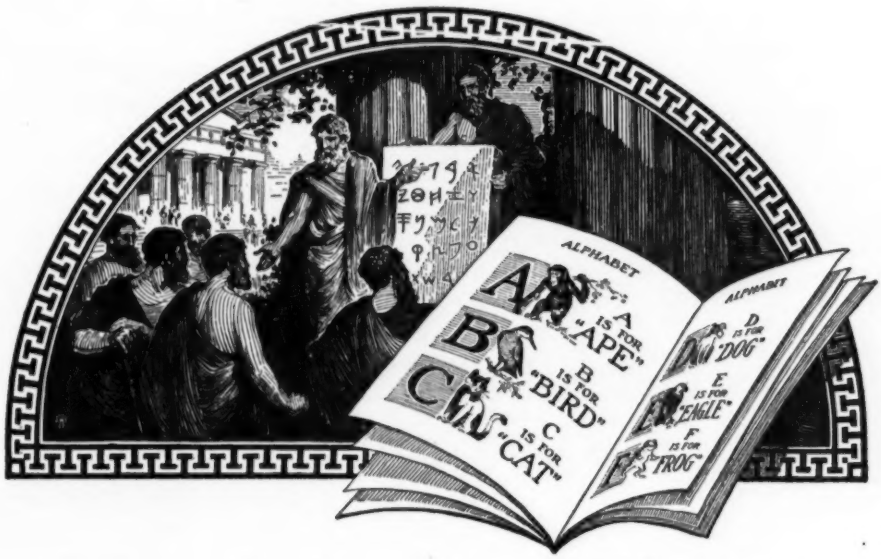
# PAPER AND PAPER STOCK IMPORTS AND EXPORTS OF THE UNITED STATES

## For the Month Ending February 29, and for the Two Months Ending February 29, 1928, as Compared with Corresponding Months of Previous Year

### IMPORTS—PAPER

| | February | | | | Two Months Ending February 29 | | | |
|---|---|---|---|---|---|---|---|---|
| | 1927 | | 1928 | | 1927 | | 1928 | |
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Paper and manufactures (total) | ..... | $10,110,993 | ..... | $12,740,217 | ..... | $22,376,314 | ..... | $25,757,554 |
| Printing paper— | | | | | | | | |
| Standard news print...lbs...free | 268,418,226 | 8,913,970 | 345,268,524 | 11,309,381 | 600,622,723 | 19,942,942 | 700,883,904 | 22,956,082 |
| Imported from— | | | | | | | | |
| Finland ...lbs. | 4,363,701 | 124,908 | 7,697,474 | 219,413 | 10,642,793 | 313,589 | 11,937,886 | 337,430 |
| Germany ...lbs. | 1,085,320 | 32,291 | 2,009,060 | 51,874 | 2,029,124 | 60,862 | 3,155,729 | 84,925 |
| Norway ...lbs. | 1,803,622 | 48,203 | 1,770,991 | 41,529 | 7,070,740 | 193,060 | 2,076,975 | 49,740 |
| Sweden ...lbs. | 9,835,908 | 297,579 | 10,255,125 | 277,467 | 25,125,555 | 745,286 | 21,517,302 | 576,732 |
| Canada ...lbs. | 249,677,765 | 8,352,302 | 318,930,731 | 10,572,594 | 541,142,001 | 18,118,658 | 634,697,679 | 21,019,227 |
| Newfoundland and Labrador...lbs. | 1,651,910 | 58,687 | 4,187,730 | 135,971 | 14,440,152 | 506,272 | 26,862,548 | 870,197 |
| Other countries ...lbs. | ..... | ..... | 417,413 | 10,533 | 172,358 | 5,215 | 635,785 | 17,831 |
| All other, n. e. s....lbs...dut. | 900,329 | 43,499 | 917,697 | 44,184 | 1,810,545 | 88,864 | 1,587,399 | 74,102 |
| Grease-proof and waterproof paper...lbs...dut. | 164,990 | 26,073 | 68,288 | 15,337 | 325,165 | 57,994 | 119,874 | 24,390 |
| Kraft wrapping paper ...lbs...dut. | 718,747 | 32,993 | 534,492 | 22,058 | 1,078,398 | 49,758 | 1,102,603 | 46,293 |
| All other wrapping paper ...lbs...dut. | 571,670 | 27,161 | 2,410,729 | 51,916 | 1,032,525 | 48,378 | 3,301,389 | 72,054 |
| Writing, letter, drawing, etc., papers.lbs...dut. | 164,590 | 41,616 | 162,742 | 43,094 | 365,633 | 89,746 | 322,323 | 83,142 |
| Surface coated paper ...lbs...dut. | 143,140 | 52,090 | 244,356 | 100,204 | 345,827 | 123,465 | 382,469 | 171,647 |
| Tissue, copying, etc., paper...lbs...dut. | 265,580 | 152,112 | 256,198 | 157,248 | 501,020 | 276,954 | 547,692 | 336,815 |
| Paper boards, n. e. s.— | | | | | | | | |
| Pulp boards in rolls ...lbs...dut. | 4,602,364 | 113,002 | 4,488,899 | 97,776 | 8,009,945 | 197,630 | 8,281,738 | 183,634 |
| Paper boards, pulp board, and card-board ...lbs...dut. | ..... | ..... | 2,877,821 | 52,631 | ..... | ..... | 5,223,253 | 110,993 |
| Leather board, test, and wall board.lbs...dut. | ..... | 74,921 | 146,577 | 3,800 | ..... | 168,370 | 178,310 | 5,136 |
| Cigarette paper, cigarette books, and covers ...lbs...dut. | 761,182 | 205,879 | 939,800 | 261,619 | 1,410,816 | 420,654 | 2,280,117 | 632,686 |
| Hanging paper (wall paper)...lbs...dut. | 327,814 | 69,406 | 341,153 | 80,181 | 585,395 | 143,587 | 550,660 | 131,822 |
| Duplex decalcomania, not printed....lbs...free | 40,539 | 9,890 | 66,695 | 15,853 | 103,486 | 25,279 | 113,657 | 26,699 |
| Paper boxes ...lbs...dut. | 177,764 | 112,910 | 217,962 | 135,512 | 343,292 | 212,087 | 467,471 | 282,494 |
| Pulp or papier-mâché and manufactures, n. e. s....lbs...dut. | 239,467 | 32,802 | ..... | 58,528 | 574,775 | 93,219 | ..... | 112,584 |
| All other paper and manufactures...dut. | ..... | 202,669 | ..... | 290,895 | ..... | 437,387 | ..... | 506,981 |
| **WOOD PULP** | | | | | | | | |
| Mechanically ground wood pulp.....tons..free | 11,360 | 356,553 | 18,885 | 488,850 | 27,769 | 808,085 | 37,708 | 934,501 |
| Sulphite wood pulp ...tons | 61,992 | 4,007,015 | 86,478 | 4,957,387 | 157,982 | 10,265,398 | 188,723 | 10,892,650 |
| Unbleached ...tons..free | 45,619 | 2,690,850 | 58,213 | 2,857,743 | 112,917 | 6,670,195 | 137,176 | 7,003,958 |
| Bleached ...tons..free | 16,373 | 1,316,165 | 28,265 | 2,099,644 | 45,065 | 3,595,203 | 51,547 | 3,888,692 |
| Imported from— | | | | | | | | |
| Finland ...tons | 6,179 | 357,028 | 12,178 | 456,706 | 12,182 | 686,898 | 19,792 | 814,228 |
| Germany ...tons | 3,731 | 285,591 | 5,105 | 350,272 | 10,441 | 750,971 | 8,456 | 594,087 |
| Norway ...tons | 6,634 | 476,608 | 8,117 | 569,450 | 11,247 | 863,028 | 11,721 | 813,603 |
| Sweden ...tons | 23,491 | 1,435,719 | 29,728 | 1,620,192 | 66,668 | 4,108,565 | 86,159 | 4,682,639 |
| Canada ...tons | 17,721 | 1,192,102 | 26,325 | 1,724,421 | 51,162 | 3,460,022 | 52,976 | 3,475,905 |
| Other countries ...tons | 4,236 | 259,967 | 5,025 | 236,346 | 6,282 | 395,914 | 9,619 | 512,188 |
| Sulphate wood pulp, unbleached (Kraft pulp) ...tons..free | 16,300 | 1.010,336 | 27,414 | 1,526,846 | 53,002 | 3,326,091 | 63,433 | 3,521,180 |
| Imported from— | | | | | | | | |
| Finland ..... | 356 | 19,258 | 2,354 | 102,120 | 946 | 53,232 | 2,354 | 102,120 |
| Norway ..... | 535 | 33,021 | 924 | 44,544 | 1,571 | 95,668 | 1,728 | 86,405 |
| Sweden ..... | 5,997 | 354,521 | 12,490 | 636,028 | 29,961 | 1,841,313 | 37,506 | 1,943,121 |
| Canada ..... | 9,340 | 599,414 | 11,548 | 740,162 | 20,304 | 1,323,465 | 21,649 | 1,380,948 |
| Other countries ..... | 72 | 4,122 | 98 | 3,992 | 220 | 12,413 | 196 | 8,586 |
| Sulphate wood pulp, bleached.....tons..free | 1,763 | 105,243 | 2,315 | 128,047 | 6,190 | 407,054 | 3,483 | 205,649 |
| Other pulp ...tons..free | 59 | 9,379 | 425 | 31,249 | 547 | 37,785 | 1,387 | 100,083 |
| **CRUDE PAPER STOCK** | | | | | | | | |
| Rags for paper stock...lbs...free | 27,744,331 | 617,708 | 31,850,737 | 631,339 | 61,273,159 | 1,344,084 | 69,482,105 | 1,312,879 |
| Waste bagging, waste paper, etc.....lbs...free | 5,286,019 | 76,507 | 8,934,491 | 114,682 | 12,219,046 | 181,830 | 17,357,395 | 229,871 |
| Old rope and all other paper stock...lbs...free | 2,950,891 | 96,462 | 3,138,915 | 102,633 | 8,813,442 | 244,273 | 9,068,095 | 232,449 |
| **CHEMICALS AND OTHER PAPER MAKERS' MATERIALS** | | | | | | | | |
| Colors, dyes, stains, color acids, and color bases, n. e. s....lbs...dut. | 926,705 | 995,988 | 598,793 | 602,830 | 1,442,834 | 1,639,520 | 1,002,242 | 1,095,409 |
| Imported from— | | | | | | | | |
| Belgium ...lbs. | 23,805 | 33,544 | 7,012 | 7,767 | 45,733 | 71,472 | 15,717 | 17,474 |
| France ...lbs. | 5,396 | 8,005 | 12,863 | 18,480 | 19,489 | 27,508 | 20,369 | 28,074 |
| Germany ...lbs. | 561,072 | 555,350 | 394,899 | 375,659 | 908,338 | 973,993 | 579,101 | 582,656 |
| Italy ...lbs. | 8,115 | 6,792 | 6,728 | 4,876 | 13,817 | 12,346 | 19,089 | 15,019 |
| Switzerland ...lbs. | 293,954 | 359,162 | 157,568 | 179,590 | 399,644 | 495,312 | 289,432 | 356,303 |
| United Kingdom ...lbs. | 16,856 | 17,192 | 11,945 | 9,456 | 31,443 | 33,276 | 16,106 | 14,305 |
| Other countries ...lbs. | 17,507 | 15,943 | 7,778 | 7,002 | 24,370 | 25,613 | 62,428 | 81,578 |
| Casein or lactarene...lbs...dut. | 2,043,008 | 240,833 | 2,203,080 | 304,850 | 5,524,695 | 640,097 | 5,435,568 | 769,904 |
| Kaolin, china, and paper clay.....tons..dut. | 22,246 | 216,541 | 17,341 | 172,961 | 50,696 | 511,489 | 36,387 | 353,517 |

(*Continued on page 56*)




# *The A-B-C of Written History*

EVERY child goes through the alphabet age. So did the human race in its childhood. Herodotus wrote of "Cadmus the Trojan" who is credited with having introduced the Phoenician alphabet among the Greeks. The latter, having learned to make symbols represent sounds, would write their first line from right to left after the fashion of their Semitic teachers. Then the second line would run from left to right, and so the inscription would wind back and forth. Soon, however, Greek writing settled down to a left to right order.

The Greek characters were changed by the Romans, whose ideas of letter formation we have modified very little even to this day.

Cadmus, whether a real person or merely a name to represent Phoenician culture, deserves our thanks. For with the successor to his alphabet the thoughts and experiences of today go into more than one hundred languages—on millions of sheets of paper—and tomorrow spread their benefits before a new generation.

**HAMMERMILL PAPER CO.**
**ERIE, PA.**

# PAPER AND PAPER STOCK IMPORTS AND EXPORTS OF THE UNITED STATES

(*continued from page 54*)

## EXPORTS—PAPER

| | February 1927 Quantity | February 1927 Value | February 1928 Quantity | February 1928 Value | Two Months Ending February 29 1927 Quantity | Two Months Ending February 29 1927 Value | Two Months Ending February 29 1928 Quantity | Two Months Ending February 29 1928 Value |
|---|---|---|---|---|---|---|---|---|
| Paper and manufactures (total) | ..... | $2,145,060 | ..... | $2,387,926 | ..... | $4,268,742 | ..... | $4,810,625 |
| Printing paper— | | | | | | | | |
| News print paper ....lbs. | 1,748,081 | 83,110 | 1,077,990 | 42,237 | 4,467,694 | 205,071 | 4,593,036 | 195,589 |
| Exported to— | | | | | | | | |
| Canada ....lbs. | 148,446 | 10,347 | ..... | ..... | 215,892 | 15,374 | 319,723 | 18,075 |
| Central America ....lbs. | 55,530 | 2,547 | 129,367 | 4,601 | 109,821 | 5,421 | 187,530 | 6,853 |
| Mexico ....lbs. | 43,442 | 2,251 | 14,864 | 683 | 85,833 | 4,564 | 41,063 | 1,984 |
| Cuba ....lbs. | 93,426 | 4,525 | 94,520 | 3,598 | 402,099 | 18,980 | 553,850 | 24,902 |
| South America ....lbs. | 733,676 | 31,109 | 306,246 | 10,929 | 1,509,251 | 63,220 | 737,293 | 28,357 |
| China, Hong Kong, and Kwantung..lbs. | 5,250 | 640 | 42,336 | 2,933 | 193,120 | 14,311 | 152,346 | 7,545 |
| Japan ....lbs. | ..... | ..... | ..... | ..... | 21,955 | 932 | 15,093 | 693 |
| Philippine Islands ....lbs. | 540,621 | 23,571 | 457,734 | 17,878 | 1,738,997 | 70,701 | 2,403,322 | 98,403 |
| Other countries ....lbs. | 127,690 | 8,120 | 32,923 | 1,615 | 190,726 | 11,568 | 182,816 | 8,777 |
| Book paper, not coated....lbs. | 1,377,969 | 118,733 | 1,705,487 | 126,993 | 3,022,715 | 245,314 | 3,299,720 | 258,866 |
| Exported to— | | | | | | | | |
| Europe ....lbs. | 71,572 | 7,573 | 82,913 | 6,149 | 119,464 | 12,233 | 104,903 | 8,263 |
| Canada ....lbs. | 299,454 | 23,930 | 433,701 | 29,873 | 639,646 | 52,907 | 792,844 | 57,510 |
| Central America ....lbs. | 35,930 | 3,064 | 27,419 | 2,307 | 71,897 | 6,960 | 45,248 | 4,556 |
| Mexico ....lbs. | 23,876 | 2,341 | 42,492 | 4,435 | 87,558 | 9,774 | 90,341 | 9,687 |
| Cuba ....lbs. | 99,514 | 10,619 | 244,440 | 18,032 | 342,249 | 29,424 | 550,949 | 41,395 |
| Argentina ....lbs. | 101,777 | 7,605 | ..... | ..... | 182,022 | 14,345 | 54,863 | 7,102 |
| Other South America ....lbs. | 203,406 | 20,893 | 85,336 | 6,730 | 797,049 | 54,941 | 236,261 | 19,389 |
| China, Hong Kong, and Kwantung..lbs. | 173,248 | 13,902 | 525,805 | 36,623 | 173,248 | 13,902 | 752,661 | 52,749 |
| Philippine Islands ....lbs. | 179,526 | 13,669 | 65,203 | 4,952 | 263,703 | 20,403 | 242,333 | 16,922 |
| Australia ....lbs. | 164,421 | 12,680 | 51,675 | 5,423 | 203,309 | 17,266 | 160,008 | 17,760 |
| Other countries ....lbs. | 25,245 | 2,457 | 146,503 | 12,469 | 142,570 | 13,159 | 269,339 | 23,533 |
| Cover paper ....lbs. | 108,213 | 21,493 | 139,619 | 25,051 | 230,066 | 41,287 | 296,435 | 49,409 |
| Greaseproof and waterproof paper....lbs. | 92,151 | 13,591 | 219,834 | 27,169 | 283,915 | 37,948 | 425,797 | 58,239 |
| Wrapping paper ....lbs. | 2,906,123 | 194,781 | 3,402,924 | 269,865 | 5,481,761 | 384,346 | 7,148,997 | 539,456 |
| Surface-coated paper ....lbs. | 390,861 | 59,798 | 682,286 | 74,765 | 1,081,962 | 137,622 | 978,309 | 118,999 |
| Tissue and crêpe paper ....lbs. | 270,231 | 60,919 | 389,516 | 88,957 | 690,095 | 144,965 | 789,265 | 181,088 |
| Toilet paper ....lbs. | 286,992 | 35,824 | 348,084 | 39,846 | 700,002 | 92,749 | 720,138 | 83,868 |
| Paper towels and napkins ....lbs. | 116,946 | 18,115 | 256,331 | 31,680 | 282,847 | 41,730 | 441,613 | 57,168 |
| Box board ....lbs. | 5,062,777 | 164,924 | 4,021,167 | 124,227 | 8,883,413 | 266,530 | 7,902,806 | 244,997 |
| Bristols and bristol board ....lbs. | 102,883 | 10,636 | 202,744 | 14,283 | 544,964 | 27,427 | 305,609 | 25,668 |
| Other paper board and straw board....lbs. | 3,223,669 | 143,296 | 2,550,696 | 135,025 | 5,745,390 | 291,611 | 5,994,093 | 297,970 |
| Sheathing and building paper....lbs. | 1,183,268 | 50,673 | 759,488 | 29,281 | 2,119,714 | 92,992 | 1,906,108 | 72,215 |
| Wall board of paper or pulp....sq. ft. | 5,826,769 | 190,070 | 3,511,946 | 123,617 | 8,338,640 | 271,231 | 6,620,334 | 227,944 |
| Blotting paper ....lbs. | 311,291 | 33,241 | 399,199 | 49,895 | 576,985 | 64,661 | 675,514 | 82,669 |
| Filing folders, index cards, and other office forms ....lbs. | 56,914 | 16,010 | 118,977 | 38,917 | 231,619 | 54,722 | 196,476 | 72,192 |
| Papeteries (fancy writing paper)....lbs. | 38,570 | 10,211 | 43,245 | 9,828 | 71,709 | 20,169 | 146,941 | 23,663 |
| Other writing paper ....lbs. | 727,029 | 125,471 | 1,528,752 | 205,235 | 1,528,969 | 261,829 | 2,932,032 | 394,735 |
| Paper hangings (wall paper) ....yds. | 4,543,623 | 81,609 | 5,668,603 | 102,050 | 6,784,249 | 134,295 | 10,109,050 | 173,180 |
| Paper bags ....lbs. | 1,197,056 | 98,503 | 727,445 | 64,558 | 2,418,896 | 201,885 | 1,411,045 | 125,180 |
| Boxes and cartons ....lbs. | 1,229,658 | 91,155 | 1,865,112 | 135,057 | 2,925,647 | 194,993 | 3,915,160 | 282,025 |
| Envelopes ....lbs. | 224,189 | 36,453 | 177,125 | 29,058 | 462,500 | 77,385 | 364,134 | 61,327 |
| Vulcanized fiber sheets, strips, rods, and tubes ....lbs. | 356,034 | 120,936 | 333,050 | 99,732 | 735,583 | 229,425 | 711,410 | 206,042 |
| Manufactures of vulcanized and indurated fiber ....lbs. | 33,282 | 10,075 | 97,176 | 18,075 | 58,783 | 16,465 | 113,961 | 24,452 |
| Cash register and adding machine paper...lbs. | 137,544 | 15,871 | 153,053 | 16,599 | 248,099 | 28,913 | 367,468 | 39,613 |
| Other paper and paper products..... | ..... | 339,562 | ..... | 465,926 | ..... | 703,177 | ..... | 914,071 |

## WOOD PULP AND PAPER STOCK

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sulphite wood pulp ....tons | 1,581 | 96,705 | 189 | 16,830 | 3,103 | 190,349 | 2,126 | 116,194 |
| Soda wood pulp ....tons | 218 | 21,220 | 98 | 7,940 | 267 | 24,273 | 398 | 33,209 |
| Other wood pulp ....tons | 134 | 7,248 | 48 | 3,025 | 487 | 18,898 | 136 | 8,608 |
| Rags and other paper stock....lbs. | 16,693,359 | 222,837 | 14,597,339 | 215,516 | 31,479,319 | 437,664 | 34,975,692 | 634,418 |

## PAPER AND PULP MILL MACHINERY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Paper and pulp mill machinery....lbs. | 2,391,142 | 573,155 | 2,319,077 | 392,626 | 5,925,361 | 1,159,066 | 3,660,022 | 688,420 |

## Saving Money With Portable Compressors

Ingersoll-Rand Company, of 11 Broadway, New York, has just completed the sixth edition of its popular 140-page, two-color book entitled, "100 and 1 Ways to Save Money with Portable Compressors." In this book the Company has embodied comparative cost data on its portable air compressors and air-operated tools (rock drills, paving breakers, clay diggers, backfill tampers, grinders, hoists, riveting hammers, chippers, metal drills, etc.). The information has been put together in handy-reference, cross-index form. In most cases, figures are presented on a man-hour basis so that they can be readily applied to local conditions in any part of the world.

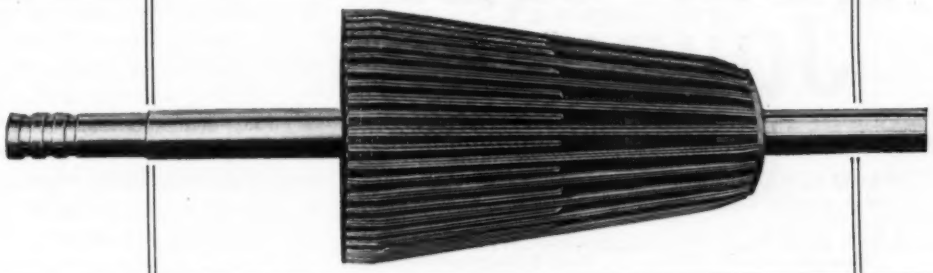
Free copies may be obtained by writing to Ingersoll-Rand Company, 11 Broadway, New York City, or any of its local Branches in any part of the world.

## A New Paper by Charles A. Esty Paper Co.

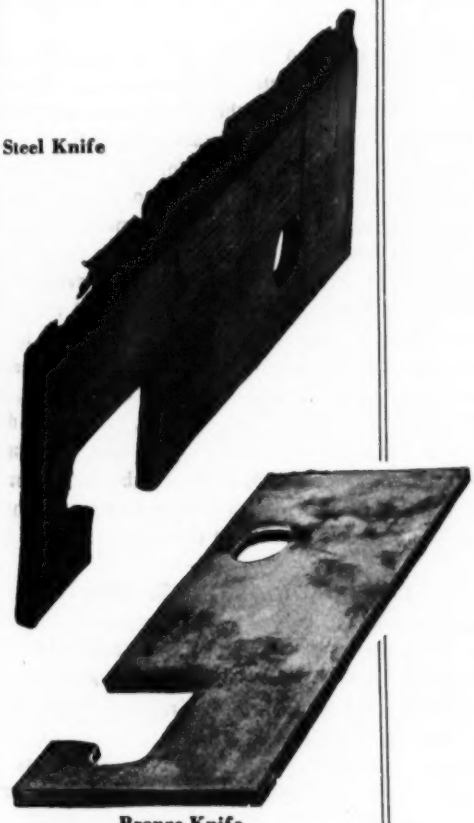
Demonstration books showing Waverly Deckle Edge Vellum—a new paper made expressly for fine booklets, folders, announcements, broadsides, programs, booklet covers, envelope enclosures and similar pieces—have been distributed to the New England trade by the Charles A. Esty Paper Company., Worcester, Boston and Springfield.

This paper with characteristic Vellum formation is made in one size only—25 x 38; four weights—120 M—140 M—160 M and (heavy-weight) 320 M; two colors—white and cream; two finishes—antique and plate. It possesses beauty and appearance, distinctive "feel" and finish and a surface that is friendly to type and inks.

A few more demonstration books are available for those who will request one.



Steel Knife



Bronze Knife

**Both of the above knives were in service the same length of time.**

# $2000 Saved in One Year

One mill reports a saving of $2000 in one year by using Hy-ten-sl Bronze Jordan Knives. Hy-ten-sl Knives do not corrode along the back leaving only a thin cutting edge; they do not burr over; nor wear rapidly thereby necessitating frequent replacements. Also, discoloration of paper stock and injury to felts from rust is impossible.

Hy-ten-sl is the strongest, toughest and best wearing bronze on the market,—far exceeding ordinary steel and other bronze bars in these respects. Hundreds of mills are now using Hy-ten-sl Knives, and all have found them to be a paying investment.

**Let us quote you on a set for both plug and shell**

**AMERICAN MANGANESE BRONZE CO.**
**Holmesburg, Phila., Pa.**

PAPER TRADE JOURNAL
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Vol. LXXXVI New York, April 19, 1928 No. 16

## DR. BAKER ON ASSOCIATIONS

Dr. Hugh P. Baker, formerly executive secretary of the American Paper and Pulp Association and now manager of the Trade Association Department of the United States Chamber of Commerce, declared recently at the annual meeting of the American Zinc Institute that more intelligent direction of industries so as to insure sound development would be one of the chief functions of the trade association of the future.

One serious problem now facing industry, Dr. Baker said, is that of so reinvesting industrial earnings as to avoid the evils of over-production and wasteful competition which may result in no profit operation and eventual failure. The consequences of failure in business are disastrous to the community and the consumer as well as to industry itself.

"A question often asked and not yet satisfactorily answered," said the speaker, " is whether business, as represented in the manufacturing, distributing or retailing field, is functioning on the basis of a carefully prepared plan or program. Such analyses as have been made of certain of the industries, particularly as to distribution and retailing, would seem to indicate that as a rule industry is going forward in this country without a definite plan, without having worked out a program that has taken into consideration all of the factors of production, distribution, consumption, financing, etc. Progress is being made, however, toward a constructive program in industry and there can be no doubt that this progress has come largely as the result of trade association work.

"Perhaps we shall not be able to achieve a satisfactory program in industry until industry finds it possible to exercise a little more conscious direction of its own development. Many, if not most industries, have grown like Topsy and more often as a result of pressure from without than from a normal urge from within. In numerous industries today, the chief competitor of the industry is not foreign goods or other commodities but capital. The pressure upon industry coming from the urge to invest moneys now idle is resulting in the constant additions to plants or the building of new plants with too little thought as to possible over-production and limited markets, or as to competition which the industry is already facing from within and from without.

"It seems more than reasonable to ask why industry should have to stand idly by and let growth take place without reasonable direction by the industry itself. It is certainly uneconomic and unbusinesslike and must make for conditions that will not be satisfactory either to the industry itself or to the public. Certainly it is good sense for an industry to get together, through its association, to consider its own future. There seems to be no question at all that this can be done on an entirely legal basis.

"Over-production trade abuses making for unfair competition, competition from foreign made goods and from other commodities, are all creating situations in industry that should make it perfectly obvious that the thinking men making up the great industries of this country should and must come together in their trade organization not only to exercise some direction as to future growth, but to build the associations into effective agencies for the giving of mutually helpful service and the accomplishment of better business.

"Much has been said, and is being said, as to keeping government out of business. Whether the government increases its regulatory control of business in this country or not, seems to depend largely upon whether business men are going to be able to get together in a sensible way to do for themselves what they need to have done through placing business on a better plane and by the bringing about of conditions that will make it unnecessary to continue to do business without a profit.

"Our inventive genius has been focused with amazing effectiveness upon improvements in the material things of life and the wonders of today that have resulted from research and inventive genius make us confident that the next generation will see even more marvelous things than we have seen or imagined. Why shouldn't the thinking business man of today, facing such difficult and complex competitive business problems that it is hard to see the way out of them all, apply to the working out of our problems of organized effort the same type of genius that has been applied with such results in material things?"

## CAR LOADINGS INCREASING

Greater industrial activity for April, May and June than for the same months last year is indicated by advance estimates of car loadings compiled by the American Railway Association, and interpreted in the current Bulletin of Ernst and Ernst, accountants and auditors.

The number of railroad cars required to move products of industry and agriculture in this quarter is 3.7 per cent higher than for the same quarter of 1927.

"This indicates," says the Ernst and Ernst Bulletin, "active production in the next three months—even more active than last year, which was considered good. These advance estimates of car loadings have proven remarkably accurate in the past. They are made not for purposes of business forecasting, but for the practical guidance of railroads in figuring their car requirements. They represent the best judgment of hundreds of manufacturers and producers, each of whom concentrates on his own line in his particular locality. There is a minimum of vagueness and impressionistic matter which often weakens business forecasting material."

Some of the significant increases in car requirements, and therefore in productivity, are the following: Coal and coke, 2.6 per

cent; ore and concentrates, .3 per cent, about the same as last year; iron and steel, 2.6 per cent; petroleum and petroleum products, 4.9 per cent; automobiles, 28.9 per cent, the largest increase of any product; agricultural implements, 10.2 per cent; lumber and forest products, 1.9 per cent; clay, gravel, sand, stone and gypsum, 8.1 per cent; lime and plaster, 3.2 per cent; cement, 6 per cent; brick and clay products, 2.6 per cent; grain, 5.5 per cent; flour, meal and other mill products, 3.7 per cent; live stock, 2.6 per cent; fresh fruits, except citrus, 1.4 per cent; potatoes, 5.1 per cent; other fresh vegetables, 3.3 per cent; poultry and dairy products, 4.2 per cent; fertilizers, 1.1 per cent, and paper, 9.8 per cent.

## News Print Production for March

Production of news print in Canada during March, 1928, amounted to 197,976 tons and shipments to 190,305 tons, according to the News Print Service Bureau. Production in the United States was 119,932 tons and shipments 113,752 tons, making a total United States and Canadian news print production of 317,908 tons and shipments of 304,057 tons. During March, 19.577 tons of news print were made in Newfoundland and 1,190 tons in Mexico, so that the total North American production for the month amounted to 338,675 tons.

The Canadian mills produced 87,843 tons more in the first three months of 1928 than in 1927, which was an increase of 18 per cent. The United States output was 36,796 tons or 9 per cent less than for the first three months of 1927. That in Newfoundland 3,522 tons, or 7 per cent more, and in Mexico 502 tons more, making a total North American increase of 55,071 tons, or 6 per cent over the first three months of 1927.

During March the Canadian mills operated at 80.3 per cent of rated capacity and the United States mills at 79.7 per cent. Stocks of news print paper at Canadian mills totalled 47,657 tons at the end of March and at United States mills 34,638 tons, making a combined total of 82,295 tons, which was equivalent to 5.6 days' average production.

## New Taggart-Oswego Mill Completed

[FROM OUR REGULAR CORRESPONDENT]

OSWEGO, N. Y., April 16, 1928—The new mill of the Taggart-Oswego Paper and Board Corporation, which has been under construction for several months, has been completed and practically all machinery has been installed. The equipment is now undergoing a final tuning up preparatory to the starting of operations. According to announcement made here this week by Corwin T. Jewell, general manager of the St. Regis Paper Company, the opening of the new Oswego mill has been set for the next Friday, April 20, when production will be started on kraft paper.

Mr. Jewell announced also that the Herrings plant of Taggart Bros. Company, which has been closed down for some time, would resume operations during the latter part of the coming week. The Herrings plant has been closed down to permit changes in the equipment. The machines in this mill have been remodeled from the cylinder type to Foundrinier type. This mill will also produce kraft paper. It is stated that both the Oswego and the Herrings mills will be operated for a time at least on kraft paper. The two palnts will employ several hundred workers.

## Union Bag Plant Closed for Repairs

[FROM OUR REGULAR CORRESPONDENT]

HUDSON, FALLS, N. Y., April 16, 1928.—The Allen Mills of the Union Bag and Paper Corporation closed down early this week for the purpose of making extensive repairs to machinery. The shutdown will last for about ten days during which time the entire equipment will be overhauled. Other units of the Union Bag plant will continue operations.

## Finnish Paper Industry Shows Expansion

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 11, 1928.—Under the influence of a strong demand sustained well throughout last year, total chemical pulp production in Finland amounted to approximately 540,000 short tons as compared with 480,000 tons in 1926, according to Paper Division, Department of Commerce.

A number of pulp mills in Finland were enlarged in capacity in 1927 and several important installations of new machinery were made. The Finnish Cellulose Union states that four new chemical pulp mills with a total annual output of 90,000 tons were erected and that one large concern, the Kymmene Aktiebolag, increased its capitalization by nearly 25 per cent for the purpose of enlarging its plant and purchasing new equipment.

Pulpwood exportation from Finland grows each year; exports in 1924 were 478,000 cubic meter compared with 1,400,000 cubic meters in 1925, with a further increase to 1,705,000 cubic meters in 1926. A slight drop to 1,651,000 cubic meters in 1927 was noted, but it is generally believed that a still further growth of these exports will be marked in 1928. The Netherlands and Germany between them imported nearly 1,200,000 cubic meters of Finnish pulp wood in 1926, with Great Britain, France, Norway, and Sweden taking nearly all of the remainder. Thus, the principal users of Finnish pulp wood are also among the most important competitiors of Finland in the world's paper markets.

Finland's total pulp exports in 1927 amounted to over 585,000 short tons as compared with approximately 504,000 tons in 1926 and 455,000 tons in 1925, an increase of 16 per cent over the past year as against 1926, and of nearly 29 per cent over 1925. During 1926 Finland's total mechanical pulp shipments were taken principally by France, Russia, and Great Britain in that order of importance, smaller quantities going to the Baltic States, Spain, Germany, Belgium, Argentina, Japan, and the United States. Sulphite pulp was exported principally to Great Britain, the United States, France, Russia, and Belgium, in that order, while the major portion of the exported sulphate pulp was taken by the United States, Germany, and Great Britain. Similar data for 1927 are not yet available, but it is believed that little or no change in the above arrangement was experienced.

Finland's total exports of paper in 1927 were 288,000 short tons, an increase of nearly 4 per cent over 1926, but slightly over 1 per cent less than similar shipments during 1925. News print is the most important export item of paper, amounting to about 60 per cent of the total. The year 1927 showed an increase of about 8 per cent over 1926 in exports of this class of paper, the most important purchasers being Great Britain, the United States, Germany, Russia, and Argentina, these countries, except Russia, increasing their imports over the previous year to a marked degree, with Argentina's imports of this item remaining practically unchanged.

Great Britain has for a number of years been Finland's best customer for sulphate wrappings, with Germany in second place. While no definite data are available on shipments into the former country during 1927, it is considered probable that the duty on wrapping paper entering Great Britain imposed in 1927 has had a marked effect on the quantity entered for consumption. Finland exported over 38,000 tons of wrapping paper in 1927, an increase of a substantial amount over 10 per cent above similar shipments during the year 1926.

## C. E. Peterson Goes With Champion Fibre Co.

[FROM OUR REGULAR CORRESPONDENT]

MADISON, Wis., April 16, 1928—C. E. Peterson, staff member of the pulp and paper section of the U. S. Forest Products Laboratory, resigned April 7 to take a position in the research department of the Champion Fibre Company, Canton, N. C. Mr. Peterson will work under the direction of John D. Rue, former chief of the Forest Products Laboratoy's pulp research, who is now director of research, for the Champion Company.

A Vulcalock Couch Roll, 24¾" diameter, 147" long, 1¼" thickness of rubber. Density 300 (⅛" ball).

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The rubber is attached directly to the aluminum base by the new Goodrich "Vulcalock" process, which actually "locks" the soft rubber to the metal surface without requiring an intermediate layer of hard rubber.

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Section of the

# Technical Association of the Pulp and Paper Industry

AN ORGANIZATION FOR THE ENCOURAGEMENT OF ORIGINAL INVESTIGATION AND RESEARCH WORK IN MILL ENGINEERING AND THE CHEMISTRY OF PAPER, CELLULOSE AND PAPER-MAKING FIBERS GENERALLY; IT AIMS TO PROVIDE MEANS FOR THE INTERCHANGE OF IDEAS AMONG ITS MEMBERS IN ORDER THAT PROCESSES OF MANUFACTURE MAY BE MADE MORE EFFICIENT AND IMPROVED ALONG TECHNICAL LINES.

Edited by
RONALD G. MACDONALD, Secretary

# Paper Testing Methods

A recent issue of the Technical News Bulletin of the U. S. Bureau of Standards outlines the progress that is being made in the revision of Paper Testing Methods.

**Under Direction of B. W. Scribner**

"The Technical Association of the Pulp and Paper Industry is actively continuing its formulation and adoption of official association paper-testing methods. This work is under the direction of B. W. Scribner, chief of the paper section of the Bureau of Standards, who acts as chairman of the formulating body, the association's paper-testing committee. The following additional 15 methods have been officially adopted by the association during the past year: Machine direction, ream weight, thickness, tearing strength and folding endurance; quantitative determination of active sulphur, moisture, ash, and starch; analysis of mineral coating and analysis of mineral filler; qualitative determination of casein, rosin, nitrogenous matter, and starch. Two other methods, opacity and gloss, have recently been completed by the committee and forwarded for the consideration of the association in respect to adoption as tentative standards. As the association has a membership of over 800 technical representatives of all branches of the paper industry, its indorsement of a paper-testing method goes a long way toward establishing it as a standard.

Another important project recently completed by the paper-testing committee is the revision of the association's publication, Paper-Testing Methods. A new edition was necessitated by the exhaustion of the present edition, there being considerable demand for this handbook of paper-testing technic. A thorough revision was considered desirable owing to the many important developments in test methods that have occurred since the previous revision in 1922. The text was largely rewritten and considerable new material was included, such as the official association methods, descriptions of 25 newly developed test methods, and 17 additional illustrations."

## TAPPI Members to Present Papers

On April 18th the Division of Cellulose Chemistry of the American Chemical Society will hold its meeting in St. Louis, Mo. Among the papers to be presented are the following:

G. W. Blanco. The Action of Alkali on Cellulose.

Mark W. Bray. The Estimation of Cellulose in Ligno-celluloses and the Amount of Chlorine Consumed on Its Isolation.

Mark W. Bray. Chemical tudies on Pulping of Spruce Wood. I—Effect of Temperature on Rate of Hydrolysis with Sodium Hydroxide.

O. L. Sponsler and W. H. Dore. The Structure of Mercerized Ramie Fibers.

O. L. Sponsler. X-Ray Methods Used in Determining Structure of Cellulose Fibers.

L. C. Fleck. The Acetylation of Aspen Wood.

Max Phillips. The Destructive Distillation of Lignin from Corn Cobs.

G. J. Ritter. Dissection of Wood Fibers by Chemical Means.

G. J. Ritter. Report of the Alpha-Cellulose Committee.

A. W. Schorger. Cellulose Acetate from Wood.

E. C. Sherrard and E. F. Kurth. The Occurrence of Pinite in Redwood (*Sequoia sempervirens*).

E. C. Sherrard and P. B. Davidson. The Tannin Content of Mountain Hemlock (*Tsuga mertensiana*).

L. E. Wise and Wm. M. Harlow. The Analysis of Wood Rays in Two Hardwoods.

W. F. Henderson. The Manufacture of Cellulose Sausage Casings.

## Starch as a Beater Furnish

SPECIAL INQUIRY NO. 101

A member desires to know the experience of papermakers relative to the use of starch and silicate of soda for beating.

1. What is the value of cooked and uncooked starch furnished to the beater as regards increased physical strength of the paper?

2. Is the use of cooked or uncooked starch in the beater in combination with sodium silicate syrup more valuable as regards increased strength characteristics than the use of starch alone?

3. Does the use of sodium silicate increase the retention of the starch; if so, what are the retention figures in each case?

It might appear as if the answers to the above questions could be obtained by a few experiments but repeated tests by the inquirer have not given consistent or uniform results.

This inquiry will be handled under the Service to Members plan and a complete transcript of the replies received will be sent to those who contribute to this survey. Send replies to

R. G. Macdonald, Secretary, TAPPI,
18 East 41st street, New York.

## Junior Technologist

Applications for the examination for junior paper technologist (Salary $1860 per year) must be received not later than April 28th by the United States Civil Service Commission, Washington, D. C. The examination will cover, chemistry, physics, mathematics and practical papermaking subjects. The successful candidate will be assigned to the Paper Section of the Bureau of Standards.

# The Chemistry of Lignin Bodies*

By Dr. Karl Kurschner, Brunn, Czecho-Slovakia

## Preface

This work is not intended to "fill a long felt want" or to "bridge an old gap," but represents an attempt to throw some light on the dark subject of lignin.

The structure of lignin is a vital question at the present time for the organic chemist. For nearly a century attempts have been made to clear up the subject but not very much has been definitely determined. In consideration of its wide distribution in plant life the solution of the problem of lignification is not only of theoretical but also of practical value. It would explain the relation of carbon to lignin on one hand and on the other, by finding a use for the sulphite waste liquor, would place the cellulose industry on an entirely different and sounder basis.

The literature on lignin has grown tremendously and as in the case of cellulose a short time ago represents a mass of contradictory data, none of which one can afford to ignore. However, one notes how a certain viewpoint expressed by one author and repeated by others gradually establishes itself in the literature as a fact.

In the short space available it is impossible to discuss all the published material on the subject and as much of the data are contradictory such a discussion might only tend to confuse the reader. This confusion will only disappear when, on the basis of some experience or other, a new idea of lignin is propounded which explains all the past performances. A definite separation can then be made between fundamental and accessory work. An excellent example applied to a definite compound is the conception of cellulose as an aliphatic alcohol.

As happens in other fields of organic chemistry, to the casual observer the question of lignin would appear hopeless inasmuch as the variable results obtained are the analyses of substances which may vary among themselves, while on the other hand fundamental questions such as the production of pure lignin, the cause of humification, etc., are entirely overlooked by those who prefer not to attack them.

I also believe that before we can hope to arrive at a structural formula for lignin the constitution of humic acid, lignites, coals and molds, which are all so closely related to lignin, will have to be solved.

These pages are written then in an attempt to approach a little nearer to this distant goal. In them I have also included selected data and hypotheses which, according to my experience, can be recommended.

KARL KÜRSCHNER.

Brünn, March, 1925.

## Introduction

In this treatise are presented the viewpoints concerning the chemical constitution of lignin, that substance producing lignification. One group of investigators emphasizes its view that lignin is an aromatic compound, while another believes that it has proven the connection between lignin and carbohydrates. Since it has not been determined that lignin is a uniform substance in different plants even of the same species, it seems quite useless to take sides on the question of the aromatic or aliphatic nature of the compound.

In order, however, to determine whether lignin is a uniform substance or is one of varied constitution in the lignified fibers (similar to tannic substances) which we term lignin, or finally a mixture of substances, the purest preparations and the nearest to the original as possible should be used in the investigation. At present we do not know whether lignin is in chemical or physical (intergrowth) union in the wood, and hence do not know how to isolate it properly. In addition the multitude of colloid chemical reactions of a plant complicates the matter. Due to the structure of the fiber we find not only biochemical reactions but also complicated physical reactions which in turn influence the former.

Will not the methods used for its isolation destroy or cause an appreciable decomposition of the lignin? How shall we determine the injurious action of the chemicals? How shall it be prevented? Even at the beginning a number of such difficulties crop up, which can be only gradually eliminated as we feel our way along even though such an uncertain progress may seem questionable to an exact investigator.

One must attempt to decide from the data on lignin at hand, even though altered, on a method for its preparation; the characteristics of a lignin produced in this manner can then be intensively investigated; a better method of production arrived at which in turn will yield still sharper characteristics, etc.

It cannot be denied that the chemist, in approaching this vital and vexed problem, is often inclined, in the face of contradictory data and puzzling experiments and hypotheses, to resign himself to the thought that he will never make any progress on this apparently thankless and forbidding field of research. Just here, however, a fundamental understanding of the subject can be had by very simple considerations. Of course one must free oneself from the spell of names such as lignin acids, lignosulphonic acids, phenol-lignins, alkali-lignins, acrolein-lignins, etc., which crop up everywhere in the literature. If, for sake of brevity, we do make use of these words, we must continually keep in mind the fact that these names do not signify the chemical constitution of the mixture.

Also, the usual method of identification of lignin by listing its characteristics on oxidation, reduction, alkali fusion, dry distillation, etc., or on treatment with acids, alkalis, or salts, cannot be taken seriously.

It is possible, however, to determine with the aid of these data what groups are supposedly present and in this way avoid tedious repetition.

Of the different reactions of lignin the most important are those produced by acetic, formic and hydroxy groups, and also methoxy and unsaturated groups. We shall investigate these characteristics later in order to determine their full significance. Then we shall get some idea of the meaning of the word "lignin." (Since there is so much contradictory data it is not possible to give its exact chemical description.)

Starting with the most frequently used spruce (fichte) lignin, our program will be as follows: Definition and formation of lignin, the form of its combination in wood; the almost unknown physiological role that lignin plays in plant life, a description of the different methods of isolation, mention of the atomic groups present and determination of the more complicated groups to see if they fit in with our present chemical conception so as to permit us to sum up the chemical properties of lignin in the briefest and most pertinent way.

## 1. Treatment of the Lignin Question

The incomparable advance of organic chemistry away from the darkness of vitalistic ideas is a product of the last century. In the course of a few years we became acquainted with an un-

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*Translated by W. E. Byron Baker and Harry Kuhe, from Sammlung chemischer und chemisch-technischer Vorträge, Vol. xxviii (Special Edition). The translators wish to acknowledge the courtesy extended to them by the publisher, Ferdinand Enke, of Stuttgart, Germany, and Dr. Karl Kürschner, in authorizing them to translate this work exclusively for the use of the Technical Association of the Pulp and Paper Industry in its publications.

This is a preliminary translation of the first part of a book written by Kürschner. The entire translation will be published at a later date by the Technical Association. Please report typographical and other errors to the Secretary of TAPPI.

dreamed of number of compounds. During this hasty expansion, however, the more promising classes of compounds claimed major attention, while those less likely to yield results were put aside, but finally even these others came in for consideration. The first work on the subject of wood, lignified materials, and lignin substances originates from this period. Soon we find quite a number of treatises on Lignin, Lignon, Lignose, Ligneux, Matiere Ligneuse, Lignireose, Vaskulose, etc. These discussions are very contradictory, which is in part due to the lack of definition of these terms. We find a similar condition in the beginning of color chemistry though there is another point which deserves consideration. The methods and laws of biology at that time were very indefinite and since lignin was considered a plant substance it became included in the field of biology. Since that time countless publications have appeared on this subject but except for a few hypotheses our knowledge in this very difficult field still remains very limited.

During the past ten years research on lignin has met with considerable interest, based for the most part on practical and economic expectations. Even though this field of study be considered an abstract scientific specialty, the benefits from it can and will be turned to practical account. The solution of the composition of lignin affords at the same time the solution leading to the utilization of sulphite waste liquor which, in 1913, amounted to a world production of forty million cubic meters. From this one can picture the extraordinary benefits to be derived from the recovery of this by-product. Only a short time ago the connection between humic acid and lignin was determined and the relation of the former to carbon followed. A knowledge of lignin may also give us better insight into the properties of carbon. It seems very probable, however, that purely chemical investigation of lignin will not yield the complete solution.

Is the problem of lignin really of such importance that so many should get excited over the subject and write so much about it? It is probably the vagueness of understanding of one of our most important materials, wood, where the question of chemical composition is continually recurring. Despite the fact that it is composed of only two main parts (lignin and cellulose) it exhibits many changeable properties. Wood is not only one of our most prominent construction materials and raw products, but due to its wonderful reproductivity will have to play an important part in the near future because of our fast diminishing supply of raw materials.[1] A picture of future possibilities is described as follows: Light metals, wood and glass are the substitutes for iron which will take its place in the future as an economically extinct or raw material.[2]

One has to approach the question of lignin, which is really an unpublished chapter of wood chemistry, unprejudiced. My intentions, as stated in the introduction, were to find a practical means for the production of lignin and then to use this unchanged substance as a starting point. Most of the investigators are at fault in that the *lignin* was subjected to too severe reactions which yielded a puzzling mixture of different compounds. This condition was further confused by the different procedures and species of wood used.[3]

By comparatively mild chemical action on spruce, our commonest wood in industry, one should obtain a lignin similar to that existing in nature and free from impurities. But what is the appearance and chemical name for lignin? This raises a number of questions, as already mentioned in the introduction, to which I wish to add my critical opinion even though opposed to current conceptions.

### 2. The Definition of Lignin

We find the name lignin first mentioned by F. Schulze.[4] He considered wood as a compound $C_{36}H_{34}O_{30}$. He also discovered a method of chemical analysis by the use of $HNO_3$—$KClO_3$. F. Czapek[5] tells us the name of lignin was first used by Candolle. Von Payen was first to give us a clearer meaning of lignin or more properly lignin substances. In his "Memoires sur les Developpement des Vegetaux" (1844) he talks of a *matiere ligneuse* which is mechanically bound to cellulose, a viewpoint which is very close to our present-day conception. His attempts to produce something definite with this "matieres incrustantes,"[6] however, yielded only a mixture of carbohydrates and lignin substances. He determined, however, that lignin contained more carbon and hydrogen than cellulose.

Our opinions, even today, are very vague as to the characteristics of the substances which govern lignification, as may be seen from the following definitions. In E. Abderhalden's "Biochemischen Handlexikon"[7] the following can be read: "One understands lignin as the non-cellulose part of wood." According to this, pentosans and hexosans, a small part of which at least must belong to the lignin complex, as well as fats, coloring matter, tannins, resins and substances containing nitrogen and mineral salts, would also belong to the lignin complex. F. Czapek and C. G. Schwalbe[8] do not commit themselves as to lignin. In Ulmann's modern "Sammelwerke," Schwalbe[9] vaguely mentions: "Besides cellulose and sugar like carbohydrates, wood consists of lignin, the real wood-forming material." That is, one finds the wood itself being used in its own definition. K. G. Jonas[10] is of the opinion that there is contained in the isolated lignin a certain wood substance, to a certain degree of uniform composition and non-saccharifiable. As we shall see later, lignin can be in part converted to sugar. Our present-day viewpoint is closely approached in a many paged and thorough definition of lignin by S. Zeisel.[11] Th. v. Fellenberg[12] recommends that lignin ought to be referred to as "ligninmethylalcohol." "The similarity between lignin and tannin substance is so great that it could be called an insoluble tannin," is finally the opinion of P. Klason.[13]

As a result of the investigations of many kinds of lignin (from spruce and red elm, typical representatives of coniferous and broadleaved trees; even oak, straw, etc.) by means of my sublimation method," it follows that we are dealing with a class of compounds and not a single, individual compound, hence it is just as erroneous to talk of the cumulative formula of proteins, which would be a quite general collective formula of proteins. For this reason Wislicenus's colloid chemical definition of lignin is probably the most satisfying one. H. Wislicenus's conception is as follows: "Lignin is the sum of all high molecular dissolved colloids which have been precipitated from the cambial sap by adsorption on the surface of the cellulose fibers."[15] He actually proved that at the time when the formation of lignin was largest, the concentration of colloids in the cambial sap was greatest.[16]

### 3. The Formation of Lignin

As to the composition of these colloid particles, which of course vary not only qualitatively from one kind to another but also quantitatively, nothing definite is known. As for spruce, which is best known in industry, I believe on the basis of many investigations that coniferin, which during the life of the plant is polymerized, serves as the chief source of lignin.

Wislicenus goes further to say that the pentosans, due to their property of being able to produce high molecular and colloid soluble or completely insoluble gels, are one of the main contributing factors to the formation of lignin, an idea which one can believe easily. These adsorption processes are for the most part preceded by other chemical changes but for biology it is necessary to determine only if the change is one of adsorption. To attempt to determine or formulate a chemical equation expressing these changes would be in vain. The view of K. G. Jonas[17] is that the formation of lignin in its first assimilation product is due to the formation of the anhydrides of hexosans or pentosans. He considers the pentosans are the elementary units of lignin. His ideas with respect to the formation of furan bodies, which during the

[1] See Appendix for all references

life of the plant are methylized and acetylized, are only one of the many hypotheses for which there is no real proof at hand.

The older views under which lignin is considered a product of cellulose, the following may be mentioned: Koenig and Rump[18] deduce that lignin is formed by the addition of acetyl, methyl or methoxyl groups, as $O.CH_3$ groups are given off in variable amounts by distillation with HI and P, and accordingly, the lignin increases with the age of the plant. V. Grafe[19] considers the formation of lignin from cellulose as "most probable." According to Kabsch and Sachs[20] lignin is the result of the transformation of cellulose and is formed at the same point where the cellulose is produced. Green[21] considers that lignin is produced by the dehydration of cellulose. According to Cross and Bevan[22] lignin is produced by intramolecular transformation, condensation and polymerization of cellulose.

**4. How Is Lignin Present in Wood?**

Is it bound solely to cellulose, the second main constituent of wood, or in addition to the saccharides of wood? Is the union mechanical or chemical? If lignin is not a single compound should this union be considered a joint mechanical and chemical one?

Payen thought, as do most of us now, that lignified bodies consisted of cellulose in which the lignin was dispersed. H. Erdmann,[23] on the other hand, draws our attention to a possible chemical union. He considers wood a compound ($C_{36}H_{46}O_{21}$) which he termed *glycolignose*. Later[24] he came to the conclusion that cellulose was present in the dispersed form previously conceived (by Payen). The majority of the subsequent investigators are also of this viewpoint. According to Hoppe—Seyler[25] and Lange[26] the end products of the soda cooks conducted under pressure, which consist for the most part of cellulose and lignin acids, are used as proof of a chemical union; still the point that the lignin acids are due to the oxidizing action of sodium hydroxide was not noticed. In addition, the other products of a soda cook are not mentioned at all. The same holds with respect to Pringsheim's[27] view: "The progress of the incrustation process must have provided for the protection of the acid radical of lignin through esterification. This lignin must be first saponified before the lignin can go into solution." If we really had to do with a saponification of an ester then we should be able to get a lignin acid by the action of concentrated HCl on this lignin ester, but as a matter of fact we do not obtain it. However, in a notable piece of work done at the instigation of Pringsheim not long ago, this point of view is no longer even mentioned.[28] Cross and Bevan[29] also consider as probable the chemical union of that part of cellulose changed into lignin with the unchanged cellulose. Even H. Magnus assumes "a union between cellulose and lignin which can be broken with a solution of caustic soda." F. Czapek[30] considers an ethereal union of "Hadromal"[31] with cellulose probable. Hadromal, however, was recognized by V. Grafe[32] as a mixture of vanillin, methyl-5-furfurol, and pyrocatechin. None of these compounds could be obtained in appreciable amounts. According to Grafe, vanillin, methylfurol and pyrocatechin and coniferin are combined in part ethereally with cellulose tissue, in part with the wood resins, and a small part present in the free state in the tissues. The formation of these compounds out of wood is so improbable that even though without exact proof many investigators refute the whole proposition. F. Czapek[33] could isolate only 0.07 per cent of the wood as Hadromal. P. Klason advances our present hypothesis of the chemical union of lignin and cellulose in two of his works, "Contribution to Our Knowledge of the Chemical Constitution of Fir (*Tanne*) Wood,"[34] in which he states that lignin is present in wood as a glucoside. In his latest paper, "Lignin as Actually Present in Wood,"[35] he assumes an acetal formation. Also, H. Pauly is of the opinion that the union is of a glucoside nature. He has determined[36] that lignin material can be brought into solution by cooking it with a low molecular organic acid. If 1 per cent $H_2SO_4$ is present the amount going into solution is quadrupled. Therefore, concludes Pauly, the lignin is present in the nature of a glucoside, which must first be broken down with a mineral acid before the organic acid can react. Another fact in favor of a chemical union is the insolubility of wood in "Schweitzer's Reagent." However, we can imagine the cellulose being covered by a protective coating of lignin.

In opposition to the views of a chemical union are, besides those of Payen, also those of Sachsse, who considers the lignin on the cellulose merely a matter of incrustation, taking the position that a compound a great deal weaker than that used in the Schulze mixture would suffice to disrupt the union if it were only a cellulose-lignin ester. On the other hand the use of a "strong cutting" compound to deal with a stubborn incrustation is easily explainable. (V. Grafe and other investigators reason to the contrary: namely, that the fact that it is a chemical union explains the difficulty of disrupting.)

J. Koenig and Rump[37] say: "It is erroneous to consider cellulose and lignin in chemical union, since after subjection of a lignified substance to many different reactions to remove the lignin or cellulose, the resultant products, raw cellulose fibers or lignin and cutin, maintain their original structure of the plant quite definitely." In conjunction with this are the following observations: Omelianoky subjected a number of flax stalks to methyl fermentation and observed that despite the fact that all of the cellulose was destroyed, the plant structure was wonderfully well preserved.[38] This ready destruction of the cellulose in the presence of the other plant constituents points to a mechanical union.

Against the assumption of destruction of form in the decomposition of a chemical compound, the formation and decomposition of nitrocellulose certainly may be cited, as this takes place with almost no structural change. According to de Mosenthal,[39] it is noticed under the microscope that a band has appeared on the attacked fiber wall of the cellulose; the fibers begin to curl up.

H. Fisher and H. Schrader[40] have centered their interest in the destruction of cellulose by the action of bacteria, to which was added a solution of inorganic bacteria food, vitalized with an aqueous extract of garden earth and left to germinate in an oven at 37 degrees C. The action on wood and cellulose is equally rapid, while lignin remained untouched. This may be due to some peculiarly of the lignin. A sample of this lignin as analyzed personally contained in addition to other impurities 1 per cent of HCl.

If we should attempt a comparison of the aforementioned possibilities, we should probably come to the same conclusion as Payen who is further supported by the investigations conducted by Wislicenus, that wood represents a complete intergrowth of carbohydrates and lignin, the lignin being formed by adsorption and the formation of a gel[41] from the colloid parts of the cambial sap on the surface of the cellulose fibers. This viewpoint is continually gaining more and more ground.

**5. What is the Function of the Lignin in the Plant?**

The physiological meaning of the formation of wood can be interpreted as a mechanical[42] fixation of the lignified material. The purpose of the lignin is to protect the plant, which fact, on account of its insolubility and inertness towards chemical attack, can be readily understood. Assuming a mechanical union in the wood, the slowness of reaction of lignin can be explained as due to its high molecular weight and its almost irreversible colloid nature (an irreversible hydrogel). In the course of further accurate study one notices that the plant physiologists support other contentions based on their line of reasoning, and that still many questions remain unanswered. According to Sachs:[43] "Lignification results in an increased hardness of the cell walls, reduction of ductility, easy passage of water without swelling." P. Sonntag[44] remarks that the cell walls exhibit great ductility; that when subjected to a force in excess of the elastic limit, the wall will stretch with the force. According to this the lignin increases[45] ductility rather than the reverse. H. C. Schellenberg[46] considers

"that lignified fibers cannot grow any more." Nathansohn[47] disputes this viewpoint with some very apt remarks. According to him the mechanical properties of the fiber are not affected by lignification. Finally Warburg[48] makes the following comment: "We are justified in the assumption that there is no real reason why a lignified fiber cannot grow, as lignified fibers maintain their contents alive over a period of many years, change the interior structure of the cell and in a certain limited sense can grow." Only shortly Casparis[49] noticed a physiological function in the elevated surface of the tracheids. We shall come back at another time to the physiological usefulness of lignification.

### 6. The Isolation of the Lignin From Wood

Lignified membranes are composed principally of cellulose and lignin while the next most important are the carbohydrates (pentosans and hexosans) which in part are closely connected to the lignin.[50] The percentage of cellulose in dry wood is about 60; incrustations or lignin in the broader sense, 30 per cent. These figures are not exact, due to the different methods of determination[51] and possible different chemical composition of the same species of wood. In addition, all methods of procedure for the isolation of lignin from lignified fiber have their weak points in the inexact definition of this body, or precisely expressed, these bodies; therefore the attempt at a lignin preparation should only be considered as a "method of first approximation" to the natural lignin substance.

As was stated in the introduction, it would be assumed that such a purified lignin would make possible more exact conclusions concerning its composition, and again that this knowledge could yield a suitable method for its isolation.

For the present, however, we shall have to be satisfied with accumulating our yield of incrustants and attempting to separate it from substances which are known to be impurities, in which classification cellulose comes first. This separation must be done without attacking the incrusting matter.

In the meantime it does not seem probable that any chemical method will yield the desired result. Since, with the aid of the Plauson colloid mill,[52] we are able to convert any substance into a highly dispersed form, a better method of attack of the problem could be attempted by reducing wood to a colloidal state.[53] The solution of such a colloid is brown colored, and when treated with an acid yields a brown powder.

In the present work the saccharides (xylan, mannan, galactan) were figured as lignin inasmuch as no analysis will distinguish accurately between them. Despite this fact we still find some exceptions to this viewpoint. As can be drawn from previous discussion we really have no definite fixed conception of this subject; that is, data based on analytical or physiological facts. A detailed discussion of the union with the pentosans will be given later.

The separation of cellulose from wood chemically takes place by two general methods. The lignin can be brought into solution by the aid of compounds having an oxidizing or hydrolyzing action[54] on the wood, or the cellulose can go into solution by proper acid treatment,[55] which is usually though not quite correctly called saccharification.

The isolation process is then dependent on the acid solution of the carbohydrates, whereby the lignin, which resists the action of the acid, remains behind; or by a solution process in which the carbohydrates for the greater part remain behind, although the lignin might in this method be seriously affected. (Refer to H. Strache-R. Lant: "Kohlenchemie," page 156, Leipzig, 1924.)

The oxidation method finds preference in its application in the manufacture of cellulose. Of special note are the sulphite and soda methods for the digestion of wood. These two subjects will be treated separately. Since the easiest method of obtaining lignin appears to be from the waste liquor[56] of these processes, we shall touch briefly on the possibility of obtaining lignin by this method.

To begin with we shall give a brief description of both methods.

(a) The Sulphite Cooking Process

The firm union of the lignin and cellulose, as has already been explained, necessitates the use of strong reagents to break it up. The sulphite process, on a very large scale, serves to accomplish this. This process depends upon the ability of a low percentage solution of $H_2SO_3$ to dissolve the incrusting matter. For example, 5 per cent $H_2SO_3$ at 90 degrees C., will completely dissolve the incrustations[57] leaving the cellulose behind. The bisulphites work more regularly. In the industry, as is well known, this process is carried out in the preparation of pulp for paper manufacture, and consists of the treatment of nut size chips of wood in stationary boilers, so called digesters, lined with hard burned brick, with a solution of calcium sulphite in an excess of sulphurous acid (the "sulphite liquor"), and with the introduction of direct steam (4 to 6 atmospheres for 8 to 15 hours) or indirect steam (up to 4 atmospheres, and up to 48 hours), which serves for the dissolving out of the lignin and the liberation of the cellulose. The sulphite waste liquor, which in this case constitutes a troublesome waste product, opposing the economical commercial utilization of the wood, appears of interest to the author because it contains all the lignin, and may be had easily and cheaply.

Many different points of view are current to explain the solubility of lignin when left in contact with $H_2SO_3$ for long periods of time at high temperatures. According to Mitscherlich and Frank[58] and others during the period of the development of the process, the purpose of the $H_2SO_3$ was to extract oxygen from the lignin. The compound split off in this manner is supposed to unite with the tannic acids. According to A. Ihl[59] sulphurous acid splits the lignin with the formation of arabic acid salts. Harpf[60] points out that in the Mitscherlich method there is a reduction during the cook of 23 per cent in the lime content of the liquor and on the other hand a reduction of 75 per cent of the sulphurous acid. He concludes from this that the cooking consists of the partial reduction of sulphurous acid to sulphur, the other part oxidizing to sulphuric acid and uniting with the lignin. In other words we might imagine the reaction taking place in a manner similar to many organic colors $R.H. \rightarrow R.SO_3H$, simple direct sulphonation.

The formation of a sulphonic acid salt is accepted by Tollens[61] and Lindsay. They early found that the calcium sulphonate obtained resembled the tannic acids.

In addition, P. Klason[62] (who made a particular study of this subject) pointed out that sulphuric acid is in fact formed during the cook. Sulphite waste liquor, on standing, generates thiosulphuric and polythionic acids:[63]

$$4SO_2 \rightarrow S_2O_3 + S_2O_5 \text{ (Dithionic acid)}$$
$$2S_2O_3 \rightarrow S_3O_3 \text{ (Thiosulphuric acid)} + 2SO_2$$

During the cook dithionic acid will form sulphuric acid:

$$S_2O_5 \rightarrow SO_3 + SO_2$$

Thiosulphuric acid, however, generates free sulphur:

$$S_2O_3 \rightarrow SO_2 \text{ and } S, \text{ etc.}^{64}$$

According to my viewpoint the following facts argue against the assumption of a direct sulphonation. The tannic compounds of wood are reduced, according to experience, by sulphurous acid,[65] the latter oxidizing to sulphuric acid which, according to the foregoing theory, sulphonates and then dissolves the lignin. For this reason wood of high tannic content should be most easily opened up (cooked). However, experience teaches us that just such woods are least adapted to the sulphite process. Klason[66] assumes, in a theory[67] designed to cover the sulphite process, three double bonds in lignin, two of which unite with $2H_2SO_3$ to form the stable ligninsulphonic acid

$$\begin{array}{cccc} | & | & | & | \\ C=C & \rightarrow & CH-CHSO_3 & \\ | & | & | & | \end{array}$$

while the remaining third bond unites with the sulphurous acid somewhat more weakly.

A fourth $H_2SO_3$ molecule is so loosely bound by a carbonyl group ($=CO \rightarrow =C\begin{smallmatrix}\diagup OH\\ \diagdown SO_3H\end{smallmatrix}$) that it breaks up even at room temperature. This hypothesis appears to be based on some experiments by A. Harpf.[66] The addition of $H_2SO_3$ to an aldehyde or ketone group, as here assumed by Klason, could be readily ascertained by the color reactions of the carbonyl groups which split off from the lignin. These are present only in very small amounts,[69] as also the work of Wichelhaus has shown.[70] As another hypothesis, the one concerning ester formation might be mentioned ($=C-OH \rightarrow =C-O.SO.OH$). It has also been suggested that the phenol nuclei in lignin bodies function as unsaturated cyclic ketones and form addition compounds with the bisulphite. The last two assumptions are negated by the fact that mild treatment with an acid or alkali will not destroy the products formed.[71] Further, the extraordinarily difficult solubility of lignin isolated by different methods, when subjected to a sulphite cook, can hardly be explained by the two hypotheses of direct sulphonation and the one mentioned. The inertness of lignin isolated by the mildest treatment is very noticeable. Finally Cross and Bevan conclude that the main part of the wood probably is a cellulose lignin ester, which is hydrolyzed by the sulphide cooking process, the lignin yielding aldehyde compounds which unite with the sulphurous acid.

I believe I can assume from experiments that not only the sulphurous acid but also the products formed by the simultaneously resulting decomposition of the cellulose, etc., function jointly in making the lignin soluble during the sulphite process. That this is indeed the case is based upon the fact that the solution of isolated lignin, by means of *sulphite liquor in the presence of cellulose*, takes place smoothly and readily.[72] This fact will be discussed later. Without doubt a number of chemical reactions jointly and successively take place. Apparently osmotic reactions also play a part.[73]

What then is the nature of the lignin which has gone into solution[74] during the cooking? We must keep in mind that even digesting wood with water under pressure will yield many products. Among those identified were formic acid, acetic acid,[75] as well as some furfural and methyl alcohol. By simply cooking finely divided wood with plain water, 12 per cent of the wood can be dissolved; included in this are 2 per cent of substance "very similar to lignin."[76]

According to J. Huebner and G. F. Kaye,[77] the treatment of cellulose with water at 35 degrees C., over extended periods, yields aldehydic compounds; therefore the action of sulphurous acid at a temperature of 130 degrees C., for a period of 30 hours, would be much more energetic. The lignin compounds (as well as resins, fats, nitrogen-containing compounds, tannins), pentosans and hexosans will be partly decomposed. The average loss of cellulose during a pressure cook is about 8 per cent of the weight of the wood or 13 per cent of the total cellulose.[78] A number of compounds are produced which, under the given favorable conditions of pressure and temperature, react with one another in many different ways. Inasmuch as the condition of cooking and raw materials will vary from mill to mill, we will always have to deal with quite different sulphite waste liquor.[79] A review of the general reactions that take place would be out of the question. From the foregoing you will begin to understand that we know very little about even the main reactions that take place.

A large number of cleavage products from sulphite waste liquor have been separated, of which the following could be identified:[80] Calcium salts of "lignosulphonic acids," sugars (dextrose, galactose, mannose, xylose), formic acid, acetic acid, methyl alcohol, ethyl alcohol, acetone, acetaldehyde, furfural, cymol, sesquiterpenes, dipentenes, resins, nitrogen compounds, etc. As for the formation of volatile organic compounds, M. Hoenig[81] remarks that "In the sulphite process in addition to other reactions hydrolysis takes place, forming formic and acetic acid, which can be identified in the cooking liquor."

From the foregoing we can conclude that there is a marked difference between the actual lignin and lignin sulphonic acids. The lignin, similar to cellulose, exhibits the properties of a compound having a high molecular weight while the lignin sulphonic acids seems to be a much smaller molecule.[82]

P. Klason,[83] in 1911, determined that according to the cryoscopic method, which is scarcely usable for compounds not completely pure, the barium salt of lignin sulphonic acid had a molecular weight of 6,000, and a few pages later[84] "about 4,000." In 1917 he finds that calcium lignin sulphonic acid has a molecular weight of "about 2,000."[85] In 1919 he determines that the calcium salt of tannin-lignosulphonic acid is 714.[86] This figure corresponds to a value of 822 to 991 obtained by K. A. Melander.[87] H. Seidel[88] has determined that the equivalent weight of sodium lignosulphonate is 500.

As to the analysis of lignin sulphonic acid, references without number can be cited; these determinations will not assist us greatly and we will not waste time on them. I shall refer in brief to the works of Lindsay and Tollens,[89] Streeb,[90] Seidel,[91] Klason,[92] Melander,[93] Oeman,[94] etc.

The very small yield of lignosulphonic acids obtained by acidifying concentrated sulphite waste liquor with mineral acids, is very marked. I investigated this fact under different conditions and found that when this originally very voluminous precipitate was purified it represented at the most only 10 per cent of the lignin. When working on a small scale this percentage is not always obtainable. The precipitation of a Russian sulphite liquor (1.046) resulted in 3.97 to 6.97 per cent yield of the total lignin. J. Spitzer[95] obtained out of 15 liters of sulphite waste liquor 94.2 grams of lignosulphonic acid. The average residue on drying sulphite waste liquor amounts to 12 per cent[96] of which 47 per cent are lignin substances.[97] In 15 liters of liquor there should be, according to this, 846 grams of lignin, but only 94.2 grams could be precipitated, which amounts to 11.1 per cent. Lignosulphonic acids similar to lignin acids can be partly dissolved in fuming HCl and yield by the addition of water voluminous brown precipitates which for the time being I have not further investigated.

It may be very probable that the action of the acid has destroyed that part of the lignin which did not precipitate out of the solution. Conclusions which may be arrived at through the lignosulphonic salts thus found can hardly be applied to the "real lignin," due to their small yield when compared to the chemically decomposed lignin. (According to a private communication of Prof. M. Hoenig-Bruenn, the precipitation of lignin with NaCl and dialysis of the salt give a higher yield of lignosulphonic acid salts.[98] An explanation of the structure of lignin from such an impure and constantly changing liquid, as W. Schrauth[99] and lately P. Klason[100] hope for, is wrong, according to that aforesaid. In consideration of the impurity of their initial substance,[101] changeability of the many decomposition products under different pressures, temperatures, and extended periods in which they have a chance to react with one another, we should not be surprised to obtain a very complicated mixture of decomposition products, which, when concentrated and precipitated with mineral acids or salted out, give a low yield of "lignosulphonic acids" of low molecular weight, and whose analytical data after all can only be designated as of chance value.

As has been stated in the beginning, the utilization of the many million cubic meters of sulphite waste liquor is one of the most important problems of the organic industry. Despite the many attempts in this direction and the countless patents issued to cover any conceivable method for making sulphite waste liquor useful, the great mass of the liquor still represents a troublesome by-product in which not less than 50 per cent of the weight of the wood is lost. In addition, the liquor represents a considerable danger to fish life. It is possible that in the future the question

of how to make use of the liquor may be superseded by the question of "how do I prevent it?"

An enumeration of the different ways of using sulphite waste liquor is given by M. Mueller;[102] C. G. Schwalbe makes a report on this subject under the title "Auszügen aus der Literatur der Zellstoff under Papierchemie" (Abstracts From the Literature of Pulp and Paper Chemistry).[103] One of the most important uses is the fermentation of the monoses in the liquor to alcohol, as is done at present in Sweden.[104] The liquor contains more than 1 per cent of sugar, of which 0.75 will be fermentable after neutralizing the acid with $CaCO_3$ and adding yeast. One cubic meter of sulphite waste liquor (approximately 36 cubic feet) will yield, on distillation, 12 liters of alcohol,[105] containing methyl alcohol, acetone and other volatile impurities which, however, are of no disadvantage in industrial applications. Germany, during the war, commenced the manufacture of alcohol in a number of plants. In Germany, figuring on a production of 600,000 tons of sulphite pulp and a yield of 10 liters per cubic meter of liquor, 22,000,000 liters of 100 per cent alcohol would be produced. M. Hoenig, A. Kupfmiller[106] and other authors produce an extract of sulphite liquor for use in the tanning industry.[107] (Even Lindsay and Tollens[108] made mention in 1890 that compounds isolated from sulphite waste liquor were very similar to the tannis.) For this purpose the liquor is purified according to a number of different methods.[109] Due to their decreased activity these products are used only subsequent to tanning as a so called "filling extract" and make possible in this way an economy in tanning extract.

Also, as a binder for blast furnace coal briquets in times when rosin was scarce, [110] for sulphite coal and for dust, the liquor has found extended use.[111]

In addition, the use as a fertilizer, when mixed with urea, might be mentioned.[112] However, the experiment proved unsuccessful.

Sulphite liquor has been used in connection with mordants (lignorosin) in the coloring industry, to produce artificial rosins and boring oil, for rapid production of storage battery plates, and even for the production of azoydes.[113] Lately attempts to obtain oils (acetone) by the dry distillation of the concentrated liquor, have been made.

A medicine under the name of "lignosulphite"[114] containing principally sulphite liquor can now be bought. It is applied in cases of tuberculosis, bronchitis and asthma, with a spray or inhalation device. The action seems to be a favorable one against the mucous membrane catarrh, without affecting the tubercular action.

(b) Alkali Pressure Cooking

A technical process affording even less possibility than the sulphite cook of yielding a lignin at all similar to the original, is the treatment of the wood with alkali, no matter whether the process is carried on at room temperatures (Beckman process for straw) or by cooking under pressure and at elevated temperatures. Of the opposite viewpoint is P. Klason[115] who considers that the lignin simply goes into solution in the black liquor unchanged as a sodium compound during the soda cook.

It is a well known fact that every kind of wood can be reduced to pulp by the soda process. This process is conducted at a pressure of 7 to 10 atmospheres (105 to 150 pounds per square inch) at a temperature of 180 degrees C., and in a time period of 3 to 6 hours at the most. The lignin forms so called lignin acids which dissolve in the excess of alkali, yielding a dark brown coloration, for which reasons the liquor that goes through the vacuum evaporator, disk evaporators, incinerators, and smelting furnaces, is called black liquor. As can be noted in a lecture by Dr. Sv. Arrhenius[116] the ratio of the rate of solution of the incrustants to that of the cellulose at 140 degress C., is 28, while at 170 degrees C. the ratio is 8.7, and at 270 degrees C., the cellulose and incrusting matters dissolve at the same speed. One drawback stultifying to a considerable extent the advantages of the applicability to woods rich in resin and tannin matter[117] and only partly peeled, arises in the generation of very offensive odors, due to methylmercaptan, $CH_3SH$, and methylsulphide $(CH_3)_2S$, the formation of which we have not yet succeeded in preventing.

Many investigators think the action of the sodium hydroxide, besides dissolving the lignin, is dissolving the xylan part of the wood. (Against this contention is the fact that the "Natronzellulose" pulp contains 6 to 7 per cent of pentosans.) E. Beckmann and O. Liesche[118] express themselves as follows: "Only by high concentration of alkali and a high pressure is it possible to extract all of the lignin. With more moderate conditions only a part of the lignin goes into solution. The lignin compounds obtained vary in color and solubility which fact is in part explainable by secondary reactions. H. Magnus[119] discovered that in cooking straw according to the soda method, 5 per cent of acetic acid can be obtained from the distillate of the cooking liquor which had been acidified. From this he concludes that the deep brown color of straw lignin can be ascribed to the loss of acetyl groups which are equivalent to the acetic acid so found. As a result of this hypothesis, neglecting the difference between the composition of wood and straw, wood lignin is 20 per cent acetic acid! In this connection one should note that cellulose alone in a 6 hour cook at 160 degrees C., at 75 pounds per square inch, using 20 per cent NaOH, produces acetic acid.[120] For this reason it is not necessary to consider the appearance of acetic acid as a decomposition product of the lignin. The subject will be taken up in detail later.

According to Magnus [121] after 4 hours at 75 pounds per square inch, 8 per cent NaOH solution will dissolve out the 58 per cent total lignin present in straw. According to the Beckmann process 12 per cent NaOH solution at room temperature dissolved after 4 hours 29 per cent of the total lignin; after 3 days, 41 per cent. In agreement with this are the data of O. Beckmann and O. Liesche, which investigators, in their attempt to digest winter rye straw with 2 per cent alcoholic NaOH solution in four successive trials each lasting 2 days, were able to extract only one-third of the lignin present. The compounds obtained, due to their easy solubility in organic solvents, can be regarded with suspicion. Their molecular weights varied between 762 and 1057. The analysis of this "sodium lignate" yielded an equivalent weight of 462. F. Paschke[122] found the equivalent weight of a "sodium lignate" produced by the soda extraction of straw to be 357. It is probable that conclusions based on the easily extractable, strongly oxidizable part of the straw lignin has little bearing on the unchanged lignin in its natural state.

Bror Holmberg[123] investigated the black liquor obtained with pure sodium hydroxide, which when acidified produced an amorphous powder. The compounds had the deportment of high molecular phenols, and "exhibited from the synthetic standpoint few encouraging characteristics."

Just the same as in a sulphite cook, the decomposition products of the carbohydrates play a part in the soda cook. Of great interest in this connection are the exhaustive studies of J. W. Nefs[124] who treated one type of sugar with KOH and obtained ninety-three different compounds in addition to saccharic resins, polysaccharides, and saccharic acids. Through oxidation an "awful mixture of carbonic, formic, oxalic, glyceric and isomeric, trioxybutyric, tetraoxy-valeric and penta-oxycapronic acids" is formed.

The yield of lignin obtained by mineral acid precipitation from the black liquor of the soda process is small, [125] which fact points toward the formation of soluble low molecular weight compounds. Better yields can be obtained by means of electrolysis.[126] K. G. Jonas says that the formation of an acid from Wilstätter lignin (see following notes) is evidently a result of the decomposition of the molecule and extensive structural changes. "By splitting a larger atomic complex there results a brown colored amorphous acid, which may also be obtained with like properties direct from

the waste liquor of wood extracted with alkalies by precipitation with mineral acid."

That lignin in the presence of alkali can be most thoroughly oxidized is also evident from a work of J. Koenig [127] according to which the lignin portion of the raw fiber is completely dissolved by $H_2O_2$ and $NH_3$. The solution contains $CH_3.COOH$, H.COOH and $(COOH)_2$. E. O. Lippman's work mentions the decomposition and oxidation of the lignin in the black liquor,[128] according to which, after acidifying the waste liquor from soda pulp manufacture vanillin can be produced. A similar report can be found in *Dingler's Journal*.[129] Lange [130] discovered as early as 1890 that the color reactions of lignin are no longer noticeable with lignin acids. This fact has been confirmed by investigations made here.

Only lately the oxidizing action of alkali on lignin was discussed thoroughly by F. Fischer and H. Schrader [131] Inasmuch as some very far reaching conclusions were drawn from this work and the subsequent investigations concerning the significance of lignin in the formation of coal, it is only proper to mention that the lignin substances used in the works above referred to (according to my investigations) consisted of such impure material that the strained deductions in so many places in the publication—disregarding the geological comments [132]—can well be regarded as not quite valid, in the absence of work with unobjectionable material. K. G. Jonas quite correctly says that peat formation takes place only in an acid medium and without oxidation, although the subject in question is the result of an alkali-pressure oxidation.[133]

According to F. Fischer, if lignin is moistened with 20 per cent NaOH and left exposed to the atmosphere, considerable oxygen is absorbed with the formation of the so called humic acids and other water soluble acids extractable with ether. As an example 1 gram of lignin absorbed in forty-one days 82 cubic centimeters of oxygen. As the process of autoxidation of lignin represents a mild oxidation when compared to the alkali-digestion or alkalifusion, a closer knowledge of the products split off by the reaction is not without significance. In addition to the humic acids water soluble and ether extractable acids were formed. By conducting the experiment on a larger scale it could be determined that apparently benzol-carboxylic acids, succinic, and oxalic acids were produced; one part is even decomposed as far as carbon dioxide, as was demonstrated by the rapid evolution of gas when the alkali solution was acidified.

The data covering the simultaneously undertaken pressure oxidation of lignin at 200 to 250 degrees C., reveal that under these conditions almost the same acids are formed. The yield of non-volatile acids is much greater, amounting to 13 per cent of the lignin. A large part of the aromatic compounds might go lost, of course, so that in the breaking of the ring aliphatic acids and even $CO_2$ are formed.

P. Klason [134] has recently concluded that the oxidation of lignin is dependent on the presence of an aldehyde group which is easily trasformed into a carboxyl. The ligninhumic acids owe their acid character to this carboxyl group.

Wood yields by treatment with caustic soda very thoroughly decomposed and oxidized [135] products, which by their low yield, low molecular weight and easy solubility in the most varied solvents, seem to be a very uncertain mixture of compounds. C. G. Schwalbe contributes the following remark on these processes: "The so called solution of the non-cellulose matter of wood by alkali or acid sulphite digestion is only an apparent solution; it is in reality a decomposition."[136] In conclusion one can support the remarks of H. Pauly.[137] "By the well known technical methods of producing pure pulp the lignin is markedly changed and a liquor of little value is produced."

(c) Additional Acid Methods for the Isolation of Lignin

In contrast to the described alkali processes, the acid hydrolysis of the wood, which leaves behind the lignin substances (mostly) undissolved, appears to cause no essential changes except a certain humification of the carbohydrate portion, increasing with the duration of the acid action, because lignin offers great resistance to acid treatment.[138]

According to Cross and Bevan, in a publication dated 1891,[139] even a cold solution of $ZnCl_2$ in very strong HCl is capable of dissolving cellulose. Another step would have been, of course, to investigate the action of the acid without the zinc chloride. But not until 1913 did Willstätter and Zechmeister [140] discover that fuming HCl (s. g. 1.212) was capable of dissolving cotton in a very short space of time. We find in their often quoted treatise attention being called to the fact that when wood is treated in the same manner, the carbohydrates go into solution leaving the lignin, which amounts to about 30 per cent, behind. Actual acid quantities and time of reaction are not given. One would expect, using fuming HCl, an almost complete decomposition of the pentosans and hexosans. That this may not be so, and that the pentosans cannot be completely separated from the lignin entity of which they are in fact a part, is concluded from investigations which will be discussed later. H. Wislicenus [141] mentions a similar viewpoint as follows: "According to my opinion one often *erroneously* does not include the more soluble complexes of pentosans, etc., and hexosans in lignin, despite the fact that for the time being we have found no accurate analytical method for the determination of lignin or cellulose."

It may be mentioned at this time, that the separation of the last residues of pentosans even from cellulose is a hard task, in fact so much so that Cross and Bevan and later C. G. Schwalbe assumed that a chemical union must exist. Heuser and Haug [142] have, nevertheless, determined that these pentosans are only impurities. E. Heuser and Kürschner [143] have shown that in the Willstätter method the (partial!) decomposition of the pentosans goes not to furfural but only as far as the pentose.

As for the manipulation of the acid hydrolysis, directions were very meager at first but later we found numerous data published. E. Heuser and E. Boedecker [144] make use of fuming acid (HCl) 81.40 per cent, in an amount which would yield a 1 per cent solution if computed on the basis of the pulp. The reaction takes place in a bottle provided with a well fitting stopper. H. Magnus [145] makes use of the same proportions. He treats the pulp 24 hours with 42 per cent hydrochloric acid, filters on asbestos and then repeats the process. E. Erdmann [146] sprinkles 1.5 liters of HCl (1.204) over 100 grams of sawdust and then directs dry HCl gas through the ice cooled mixture for a period of 2 hours. The mass is then placed in a tightly sealed bottle, and left to stand for a period of 48 hours, during which time it is shaken repeatedly. R. Wilstatter, according to a later publication,[147] treats 200 grams of spruce powder with 9 liters of HCl (1.21) for 4 hours, adds 1300 grams of ice, dilutes after 18 hours with 1300 cubic centimeters $H_2O$ and filters. "The lignin obtained still contains large quantities of substances which can be saccharified." The lignin produced by acid hydrolysis of the wood contains quite certainly, methyl and methoxyl groups. These, as mentioned by E. Heuser,[148] can be partly split off by longer treatment with fuming HCl.

The lignin produced by Wilstätter, according to K. G. Jonas,[149] differs from the natural lignin in that it no longer contains acetyl groups (analogous to the conception of Magnus in reference to the alkali digestion).

We therefore know approximately what changes have taken place in the lignin thus prepared which cannot by any means be said for the lignin obtained from waste liquor. Without doubt the Willstätter lignin is the purest with which we have to deal.[150] This seems to be well accepted, as scientific investigators generally select this method of preparation to produce a standard lignin.[151] C. G. Schwalbe,[152] mentions that even upon heating with acid, lignin offers very great resistance, even if one applies these acids with or without pressure, as is indeed also proven in the aforementioned Willstätter method for the preparation of lignin.

Koenig and Rump,[132] give another method for the production of lignin by means of acid hydrolysis by heating under a pressure of 6 to 7 atmospheres with 1 per cent HCl. In this certain portions of the lignified membranes, ortholignin and ortho-hexosans go into solution.

P. Klason,[134] suggests the following procedure: Spruce wood flour is treated with 4 to 5 times its own weight of 70 per cent $H_2SO_4$ and allowed to stand for 48 hours, then diluted to 6 times its original volume, several times decanted, and cooked, washed for a week until the wash water is only slightly yellow and Fehling solution is hardly reduced by it, then dried under vacuum. A lignin prepared in this manner is brown-black and fairly strongly humified. By a one hour treatment with fuming HCl, Klasons lignin can be partly dissolved. A bulky precipitate is obtained when the dark brown filtrate is digested with water. This observation does not speak very well for the inertness of the lignin prepared according to Klason.

H. Pauly[138] sets about to produce "the so called lignin forming material" by treating wood with at least 50 per cent acetic acid (or formic acid) in the presence of one part of concentrated $H_2SO_4$ for 8 to 30 hours' cooking at an elevated temperature and pressure. The precipitation of a gray powder is produced by evaporation under vacuum, which essentially appears to be high molecular phenols and should be utilizable commercially in technical products. The actual gist of this process seems to be the hydrolysis of the wood with a 1 per cent mineral acid, which means the principle is the same as that used by Koenig and Rump.[136] Schmidt[137] mentions in a work of his the quantitative extraction of lignin substances from lignified matter, by $ClO_2$.[138] H. Schreder[139] considers this a least destructive method of preparation. One cannot, without further qualifying comment, agree with this, since doubtlessly oxidation processes are the foundation of this, as lignin is oxidizable even in the absence of alkalies to a large degree. Quoting from E. Erdmann's "Teerbildner der sächsisch-thüringischen Schwerkohle" (1921): "A lignin prepared from pine (Kiefer) wood, according to Willstätter, ignited after being exposed for 25 seconds in a stream of ozone of 2 per cent concentration." Furthermore, by treatment with $HNO_3$ a yield of 20 per cent oxalic acid can be obtained.[140] (This seems to indicate an aromatic nature of the lignin substance, because with cellulose a yield of 120 per cent and more oxalic acid can be obtained.[141]

An idea of how variable lignin products can be, even when produced with the same reagent (highly concentrated HCl), can be gained from the following table, in which the individual characteristics of the lignins so produced are summarized.

At this point I would like to mention the as yet greatly to be desired values which have been found through calculation of carbon and hydrogen content of lignin bodies.[173]

| No. | Investigator | Nature of the Lignin | Carbon % | Hydrogen % |
|---|---|---|---|---|
| 1 | Stackman [173] | Dicotyledonous wood lignin.. | 53.10-59.60 | 4.40-6.30 |
| | | Coniferyl wood lignin..... | 65.60-67.80 | — |
| 2 | Koroll [174] | Walnut & hazelnut wood lignin | 51.50-54.20 | 4.80-5.50 |
| | | Linden and elm wood lignin.. | 53.60-54.90 | 4.90-6.00 |
| | | Sweet birch wood lignin..... | 72.70 | 7.80 |
| 3 | Fr. Schulze [175] | Wood lignin ..... | 55.55 | 5.83 |
| 4 | W. Henneberg [176] | Fodder lignin ..... | 55.40 | 5.70 |
| 5 | Th. Dietrich & J. Koenig [177] | Fodder lignin ..... | 55.00-55.59 | — |
| 6 | C. Krauch & v.d. Becke [178] | Fodder lignin after treatment with Schulz's reagent..... | 50.27-57.19 | 5.87-8.14 |
| | | Raw fiber after treatment with Schulz's reagent ..... | 51.05-69.64 | — |
| 7 | Kuhn, Aronstein & Schulze [179] | Fodder lignin ..... | 55.00-59.75 | 5.78-7.50 |
| 8 | J. Koenig & R. Murdfield [180] | Fodder lignin ..... | 53.75-59.04 | — |
| 9 | J. Koenig & Fürstenberg [181] | Fodder lignin ..... | 52.84-60.90 | — |
| 10 | J. Koenig & Fr. Hühn | Wood lignin ..... | 50.00-66.94 | — |
| 11 | Cross & Bevan | Non-cellulose lignin ..... | 57.80 | — |

## Appendix

1. Compare in this connection the Reports of the World Conference [144] Wembly, London. 1924.
2. P. Walden, Die Chemie der Gegenwart und Kulturaufgaben der Zukunft; Rostocker Hauptversammlung des Vereins deutscher Chemiker, 1924.
3. Compare K. Kürschner, Ch.-Z. 48, 461.
4. C. 1857, 321.
5. Biochemie der Pflanzen, 1912.
6. C. r. 7, 1052; 8, 51, 69; 9, 149. Compare Baumhauer, Journ. prakt. Chem. 32, 210; Fromberg, Berzelius Jahresber. 24, 462; Chevandier, Ann. chim. phys. 10, 129; C. r. 20, 138; Petersen und Schoedler, Ann.

| Product | Prepared by | On the Ash-free substance C % | On the Ash-free substance H % | $OCH_3$ % | Pentosan % | Ash % |
|---|---|---|---|---|---|---|
| Lignin, Willstätter (24 hours) | Fischer [162] | 64.79 | 5.68 | 13.08 | not mentioned | 2.85 |
| | Schrader [162] | | | | | |
| | F. Koenig [163] | 55.40 | 6.34 | not mentioned | not mentioned | |
| | Kürschner | 58.84 | 6.09 | 12.07 | 8.00 [164] | 0.37 |
| Purified Lignin of the Bergin Plant, Mannheim-Rheinau | Fischer | 62.70 | 5.17 | 13.60 | not mentioned | 3.33 [162] |
| | Schrader [162] | | | | | 4.08 [165] |
| | Kürschner | n. m. | — | — | 2.72 | 17.73 [166] |
| Lignin, Hägglund | E. Hägglund | {65.47 [162] {64.06 [167] | {5.47 [162] {5.35 [167] | {14.39 [162] {14.68 [167] | — 4.92 [167] | — 0.8 [167] |
| | Kürschner | — | — | — | — | — |
| Lignin, Kürschner | Kürschner [168] | 58.93 | 6.09 | 11.60 | 12.90 | 0.36 |
| Lignin, Klason (with Str. 804) | J. Koenig [169] | 64.86 | 4.86 | 13.90 | — | — |
| | P. Klason [170] | 66.67 | 5.49 | 7.01 | — | — |
| | Kürschner | 59.98 | 5.91 | — | 2.33 | 4.81 |

| Cellulose Reaction | HCl % | Humic Acids | Other Impurities | Color | Solubility in hot $CCl_3.COOH$ | Phloroglucin-HCl Reaction |
|---|---|---|---|---|---|---|
| not mentioned | not mentioned | not mentioned | not mentioned | brown | not mentioned | not mentioned |
| — | not mentioned | not mentioned | not mentioned | light brown | not mentioned | not mentioned |
| + | + | — | — | cocoa brown | easily soluble | weak only after standing a long time |
| not mentioned | not mentioned | extracted cold 2.6% | not mentioned | brown | not mentioned | not mentioned |
| — | 0.91 | at least 4.06% | carbon, sand particles | dark brown | carbon residue | — |
| ? | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned |
| ++ | + | — | $SiO_2$-dust | light brown | easily soluble | — |
| — | trace | — | — | similar to red shade of fir | very easily soluble | purple colors |
| not mentioned | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned |
| not mentioned | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned | not mentioned |
| — | — | not mentioned | carbon 5.93% $SO_2$ [171] | brown black | leaves behind a carbonaceous residue | — |

27, 142; Mulder, Physiologische Chemie S. 209, 475; Frémy, C. r. 48, 202; 83, 1136; Frémy und Terreil, Bull. 1868, 436; Frémy und Mitarbeiter, Bull. 9, 436; 28, 175; 36, 409.
7. II. Bd. S. 237.
8. Chemie der Zellulose, Berlin, 1911.
9. Enz. d. techn. Chemie 6, 417 (1919).
10. Zeitschr. f. angew. Chem. 34, 290 (1921).
11. J. Wiesner, Die Rohstoffe des Pflanzenreiches II, 345, Leipzig, 1918.
12. Mitteilungen f. Lebensmittelunt. u. Hygiene 8, 1-29, Schweiz. Gesundheitsamt, 1917.
13. Schriften des Vereins der Zellstoff- und Papierchemiker Heft 2, S. 26, Berlin, 1911.
14. This will be discussed thoroughly later.
15. Kolloidzeitschrift 27, 213 (1920). Compare further the thorough treatment of lignification by H. Bechold, The Colloids in Biology and Medicine, 4th edition, page 269 (Dresden-Leipzig, 1922). A very thorough discussion of the conception of lignin, to which we return later by reason of its exceptional clarity, was first undertaken recently by H. Wislicenus at the convention of the Verein der Zellstoff- und Papier-Chemiker und -Ingenieure, Berlin, March 5, 1925. Compare also Cellulosechemie 6, 45 (1925).
16. Same source as above, page 216.
17. Referred to on page 290 of above reference.
18. C. 1914, II, 1162; compare also J. Koenig, Ch.-Z., 1912, 1101.
19. Unters. über die Holzsubstanz vom chem.-physiol. Standpunkt S. 43, Wien. 1904.
20. Zeitschr. für Chem. u. Ind. d. Kolloide 6, 17 (1910); compare also Sachsse, Chemie und Physiologie der Farbstoffe S. 133; Fromherz H. 50, 210.
21. Zeitschr. f. Farben- und Textilchemie 3, 39 (1904).
22. Cellulose S. 179 ff., London, 1903.
23. C. 1857, 321.
24. H. Erdmann and Baltzer, Just Jahresberichte, 1873, 295.
25. H. 13, 77.
26. H. 14, 15 and 217.
27. Die Polysaccharide S. 50, Berlin, 1919.
28. Der gegenwärtige Stand der Ligninchemie von R. Riefenstahl, Zeitschr. f. angew. Chem. 37, 169-177.
29. Cellulose S. 201.
30. H. 27, 156.
31. The name is derived from "hadrom," the water carrying tissue.
32. Sitzungsber. d. kaiserl. Akademie der Wissenschaften in Wein, mathemat.-naturwissenschaftliche Klasse 93. Abt. 1, S. 294.
33. Biochemie der Pflanzen, 1905, 1912.
34. C. 1919, I, 92.
35. B. 55, 456 (1922).
36. Austrian patent 3069-18, Klasse 12e.
37. Chemie und Struktur der Pflanzenzellmembran S. 87, Berlin, 1914.
38. Handbuch der Mykologie, herausgegeben von F. Lafar, III, S. 261-262.
39. Journ. Soc. Chem. Ind. 26, 443-448 (1907).
40. Brennstoff-Chemie Heft 5 and 15, Essen, 1922. Compare also K. Kürschner, Braunkohlen- und Brikett-Industrie. Messeheft, 1925.
41. The mineral salt ions of the sap of the tracheids and vessels, rising from the root, coagulate the high molecular weight material of the sap of the medullary ray tissue.
42. J. Koenig and collaborators, Landwirtschaftliche Versuchsstationen 65, 55. Koenig points out that wood rich in lignin is always formed where the stick is taxed in mechanical strength.
43. Lehrbuch der Botanik 4. Aufl., S. 21.
44. Die Beziehungen zwischen Verholzung, Festigkeit und Elastizität vegetabilischer Zellwände, Landwirtsch. Jahrbücher, 1892.
45. Compare P. Sonntag in above reference.
46. Jahrb. f. wissenschaftl. Botanik 29, 237 (1896).
47. Same reference 32, 671 (1898).
48. B. Bot. Ges. 11, 425 (1893).
49. Pharm. Monatsh. 1, 121 ff., 153 ff. (1920).
50. H. Wislicenus, Kolloidzeitschrift 27, 220; Cellulosechemie 6, 45 (1925); K. G. Jonas, Zeitschr. f. angew. Chem. 34, 290 (1921); compare also E. Schmidt and collaborators, B. 56, 30 (1923).
51. Compare the critical summary by Suringar and Tollens, Zeitschr. f. angew. Chem. 9, 716; Berichte der internationalen Analysenkommission für den internationalen Kongress zu London, 1909; M. Renker, Die Bestimmungs-methoden der Zellulose, Berlin, 1910; C. G. Schwalbe in Ullmanns Enzyklopädie der technischen Chemie 6, 420; further J. Wiesner, Die Rohstoffe des Pflanzenreiches II, 332, Leipzig, 1918; H. Wislicenus, Cellulosechemie 6, 48 (1925).
52. Ch.-Z. 44, 566 (1920).
53. It is assumed that we have here in fact a mere "incrustation" or intergrowth (Wislicenus, referred to above; E. Rump, Inauguraldissertation S. 45 ff., Münster i. W. 1914) to deal with, which is indeed very highly probable (compare along these lines also A. Lehne and W. Schepmann, Zeitschr. f. angew. Chemie 38, 98, 1925), and that no additional reaction with the adsorbent has taken place, as this in part is the case between the "real lignin" and the pentosan. Prof. Plauson has, at my request, in a most obliging manner, already personally conducted experiments in the most thorough possible disintegration of wood, without the addition of another dispersion agent except water. Similar trials were also conducted by H. Wislicenus (Cellulosechemie 6, 56, 1925). He writes about this: "The final result shows certainly a partial but only small splitting off of soluble lignin, which as an evaporated filtrate gave the (nevertheless secondary) lignin reactions, but no striking result."
54. For example, chlorine (Cross and Bevan), nowadays very thoroughly studied (compare C. G. Schwalbe, Zeitschrift. f. angew. Ch. 36, 181); Watt and Burgess, 1853; alkalisulphide (Helbig, 1882); $H_2SO_3$ (P. Clausen, 1851. Tilkhman, 1866); Bisulphite (Tilghman, 1866); further NO (C. G. Schwalbe, Ch.-Z. Rep., 1908, S. 651); $ClO_3$ (Schmidt and Collaborators, B. 54, 1860, 3244; B. 56, 23, 1438). Compare with this the notes of E. Heuser, B. 56, 907; Acetic or formic acid plus 1 per cent $H_2SO_4$ (H. Pauly, O. P. A. 3069-18, Klasse 12e); phenols and phenolether-containing tar oils (Bühler, Chem. Ind., 1903, 138; M. Renker, dissertation at Charlottenburg, 1921); Phenols and acids (Hartmuth, Ger. pat. 328,783); acid chlorides (Schwarzkopf, Ger. pat. 328,730); amines (Schlosser, Ger. pat. 328,729); J. Gruss (B. Bot. Geo. 41, 53) cooks ground wood paper with HCl plus alcohol and obtains out of the solution crystallized lignin alcohol. This last work from a chemical standpoint is considered quite lacking in clearness, even disregarding that paper which is rendered impure by fillers, dyestuffs and adulterants, constitutes no basic material for lignin.
55. Willstätter and Zechmeister, B. 46, 2403; Peter Klason, Berichte über die Hauptversammlung, 1908, der Papier- und Zellstoffchemiker S. 53; E. Rump, Chemie und Struktur der Pflanzenzellmembran, Berlin, 1914, S. 16 ff.; Ost and Wilkening, Ch. 34, 461.
56. Compare W. Schrauth, Zeitschr. f. angew. Chem. 36, 149
57. Compare Pictet and Brélaz, D. R. P. 26,331; A. Klein, Verhandlungen der Zellstoff- und Papierchemiker, 1908, S. 50; further P. Klason, Zellstoff-chemische Abhandlungen 1, 105 (1920). Water alone, under pressure, according to E. Rump (elsewhere referred to, page 000) dissolves 38 per cent of fir wood, on air dry, resin free, weight basis. Compare P. Klason, Beiträge zur Kenntnis der chemischen Zusammensetzung des Fichtenholzes S. 29 ff., Berlin, 1911; further Cross, B. 26, 2520.
58. Papierzeitung, 1887.
59. Ch.-Z. 15, 202.
60. Beiträge zur Kenntnis der chemischen Vorgänge beim Sulfitverfahren, Leipzig, 1893; further Kirchner, Papier III, B and C. Zellstoff S. 136.
61. Ann. 268, 341.
62. Berichte des Vereins der Zellstoff- und Papierchemiker, 1909, S. 67 ff.
63. I convert these equations into anhydride form on behalf of simplicity.
64. Concerning the formation of polythionic acids during sulphite cooking, as observed by me, more will be said later.
65. Compare C. G. Schwalbe, Chemie der Zellulose S. 530.
66. Schriften des Vereins der Zellstoff- und Papierchemiker, Heft 2, S. 25 ff.
67. He wrote in reference to this recently as follows (B. 58, 379): "A theory of the sulphite cooking process must aim to give an explanation of all the known quantitative relationships involved." "For the sulphite technician—and I have worked with lignin exclusively for technical purposes—hypothesis has little or indeed nothing, while on the other hand a comprehensively founded theory has naturally a high value."
68. Beiträge zur Kenntnis der chemischen Vorgänge beim Sulfitverfahren S. 38, 39, Leipzig, 1893.
69. Compare V. Grafe, Untersuchungen über die Holzsubstanz vom chemisch-physiologischen Standpunkt, Wien, 1904; further C. G. Schwalbe, Die Chemie der Zellulose, Berlin, 1911.
70. B. 49, 2001; 50, 1683; 52, 2054.
71. Compare also Seidel, Zeitschr. f. angew. Chem. 13, 951-56.
72. K. Kürschner, Brenntstoffchemie, 1925.
73. Compare Schubert-Knösel, Die Zellulosefabrikation S. 49, Berlin, 1906.
74. And indeed "dissolutio," not "solutio."
75. Cross, B. 26, 2520.
76. P. Klason, Schriften des Vereins der Zellstoff- und Papierchemiker, Heft 2, S. 31, Berlin, 1911.
77. Jour. Soc. Chem. Ind. 41, 945.
78. Compare Hägglund, Die Sulfitablauge, 1915.
79. Compare C. G. Schwalbe, Brennstoffchemie S. 277 (1921).
80. Compare also C. G. Schwalbe in Ullmanns Enz. d. techn. Chemie 6, 415, Berlin-Wien, 1919.
81. Ch.-Z., 1912, 889.
82. Compare H. Wislicenus, Kolloidzeitschrift 27, Heft 5.
83. See note 62.
84. Above source, page 37.
85. Arkiv för Kemi 6, Nr. 15, S. 13.
86. C. 1919, I, 92.
87. Kemi och Bergvetenskap, 1918, Nr. 10-12.
88. Zeitschrift f. angew. Chem. 13, 951, 1307.
89. Ann. 267, 341.
90. Inauguraldissertation, Göttingen, 1892.
91. Zeitschr. f. angew. Chemie 13, 951 and 1307.
92. Schriften des Vereins der Zellstoff- und Papierchemiker, Heft 2, Berlin, 1911; C. 1918, II, 1302; 1919. I, 92; IV, 149 usw.
93. Cellulosechemie II, 41, 57 (1921).
94. Papierfabrikant 14, 509 (1916).
95. Compare M. Hoenig and J. Spitzer, M. 39, 443.
96. Stutzer, Papierzeitung 8, 3561, 3567; 9, 5.
97. P. Klason, Papierfabrikant 7, Festheft 27.
98. As is to be understood from the inaugural dissertation of F. Koenig (Göttingen, 1921). K. A. Melander (referred to above) obtained through salting out with NaCl up to 26 per cent of the dry substance of evaporated sulphite liquor as sodium lignosulphonate. These data, however, do not signify much, as one can obtain by thorough concentration of sulphite waste liquor also all the dissolved dry matter as a dry residue.
99. Zeitschr. f. angew. Chem. 36, 151.
100. B. 58. 375 ff.
101. Especially the resins cling tenaciously to the final products (V. Grafe, Sitzungsberichte d. kaiserl. Akademie der Wissenschaften in Wien, 113, Abt. 1, 262).
102. Die Literatur der Sulfitablauge, Schriften des Vereins der Zellstoff- und Papierchemiker, Berlin, 1910.
103. Published by the same "Verein."
104. E. Hägglund. Die Sulfitablauge, 1915; Papierzeitung 45, 3510.
105. Zeitschr. f. angew. Chem. Ref., 1917, 343.
106. Thesis at Munich, 1909; in this are exact data concerning tanning with sulphite waste liquor; Wochenblatt, 1911, 42, 575.
107. Older reports and also Stutzer, Zeitschr. f. angew. Chem. 26, 463; H. Philippi, C. 1908. I, 1232; 1909, II, 400. For the latest compare C. 1922, IV, 288.
108. Zeitschr. f. angew. Chem. 5, Heft 5; further Lange, H. 14, 15, 217.
109. Ger. patents 75,351; 132,224; 183,415; 194,872; 195,643; 203,648; 207,776; 211,348; 254,866; 280,330; 281,484.
110. C. 1919, II, 428.
111. Ch.-Z. 1920, 160; Papierfabrikant 1920, 159.
112. Bokorny, C. 1920, I, 342; II, 595.
113. C. 1918, I, 976; 1919, IV, 149.
114. E. Poulsson, Lehrbuch der Pharmakologie S. 412, Leipzig-Kristiania, 1922.
115. Schriften des Vereins der Zellstoff- und Papierchemiker, Heft 2, S. 13, Berlin, 1911.
116. Zeitschr. f. Elektrochemie 30, 375, 1924.
117. Soluble in alkali by reason of their acid nature.
118. Zeitschr. f. angew. Chem. 34, 285.
119. Theorie und Praxis der Strohaufschliessung S. 9 ff., Berlin, 1919.
120. Hoppe-Seyler, H. 13, 77-82.
121. Same reference, page 14.
122. Zeitschr. f. angew. Chem. 34, 465; Wochenblatt für Papierfabrikation Nr. 33, 1920.
123. B. 54, 2418.
124. Ann. 403, 204 (1914).
125. Thus there was obtained, from a four hour pressure heating under the other working conditions of the soda pulping process, from 20 grams dry spruce wood flour, 1.6 grams of lignin acids, equivalent to 26.5 per cent of the total lignin present. In another extraction there were obtained 3.27 grams lignin acids from 40 grams spruce wood flour, which amounts to nearly the same figure as in the former, viz., 27 per cent of the total lignin.
126. Langlet, Ger. patent 224,411
127. B. 39, 3564.
128. B. 37, 4521.

129. 216, 372.
130. Z. physiolog. Ch. 14, 15-30, 217-226.
131. Consult Abh. Kohle 4, 13 (1919); 5, 200-210 (1920); 221-229 (1920); 322 bis 359 (1920); further H. Schrader, Brennstoffchemie 3, 161 and 181 (1922).
132. Consult R. Potonié, Die Ligninabstammung der Kohle eine geologisch-paläontologische Unmöglichkeit, Braunkohle 21, 365 (1922).
133. Zeitschr. f. angew. Chem. 34 (1921). Strache-Lant write exhaustively on this whole question (Kohlenchemie, 1924, S. 24-38, inclusive).
134. Zellstoff und Papier I, 56 (1921).
135. Concerning the oxidizability of lignin see C. G. Schwalbe, Zeitschr. f. angew. Chem. 36, 174; in the presence of alkali F. Fischer and H. Schrader, a. a. O.; E. Rump, Chemie und Struktur der Pflanzenzellmembran, S. 11; further K. G. Jonas, referred to elsewhere.
136. Ullmann, Enzyklopädie der technischen Chemie VI, S. 416.
137. Austrian patent 3069-18, Klasse 12e.
138. K. G. Jonas, Zeitschr. f. angew. Chem. 34, 289; further C. G. Schwalbe, Zeitschr. f. angew. Chem. 36, 174; Strache-Lant (Kohlenchemie S. 158) write: "HCl does not strongly attack lignin, even in most concentrated form."
139. Chem. News 63, 66; Cellulose p. 9, 114; London, 1903.
140. B. 46, 2403.
141. Kolloidzeitschrift 27, 220.
142. Zeitschr. f. angew. Chem. 31, 99.
143. Papierfabrikant, Festheft 1921, S. 73.
144. Zeitschr. f. angew. Chem. 34, 462.
145. In above source, page 14.
146. Zeitschr. f. angew. Chem. 34, 313.
147. B. 55, 2640. In reference to other methods see E. Hägglund, Arkiv för Kemi 7, Nr. 8 (1918); further Heuser and Wenzel, Papierfabrikant, 1921, 24a; Wäntig and Kerényi, Zellstoffchemische Abhandlungen S. 65 (1920); Dangeville, Ger. pat. 11,836; Koenig and Becker, Veröffentlichung der Landwirtschaftskammer für die Provinz Westfalen, Heft 26 (1918), etc.
148. Papierfabrikant, 1921.
149. Zeitschr. f. angew. Chem. 34, 289.
150. Of opposing view—on ground of hypothetical assumptions—is W. Schrauth, Zeitschr. f. angew. Chem. 36, 150.
151. Consult also K. G. Jonas, Zeitschr. f. angew. Chem. 34, 289; F. Fischer and H. Schrader, Brennstoffchemie 3 (1922); E. Erdmann, Zeitschr. f. angew. Chem. 34, 313; E. Beckmann and O. Liesche, Zeitschr. f. angew. Chem. 34, 287; H. Magnus, see page 000; E. Rump, see page 000; E. Heuser and A. Winsvold, B. 56, 903, etc.
152. Zeitschr. f. angew. Chem. 36, 174.
153. Chemie und Struktur der Pflanzenzellmembran, Berlin, 1914.
154. Bericht über die Hauptversammlung 1908 des Vereins der Papier- und Zellstoffchemiker S. 53; compare further Flechsig, H. 7, 523, 913; Koenig, Papierzeitung 34, 461 (1910); J. Koenig, Zeitschr f. Unters. d Nahrungs- u. Genussmittel 12, 385.
155. Referred to elsewhere.
156. One cook carried out by me in this manner gave upon concentration in vacuum only a small quantity of slimy residue. A second sample fairly strongly acidified with sulphuric acid gave a small yield of yellow-brown powder. From 10 grams spruce wood I obtained 0.80 gram lignin.
157. B. 54, 1860, 3241; 56, 23. Compare also German patent 375,510 for preparation of a fodder from wood or other substance rich in lignin by means of $ClO_2$.
158. Prepared from $KClO_3$ and oxalic acid.
159. Brennstoffchemie 3 (1922).
160. Heuser and collaborators, Zellulosechemie 2, 13 (1921).
161. Cross and Bevan, Cellulose (1918), S. 213; A. v. Hedenström, Ch.-Z., 1911, S. 853.
162. Gesammelte Abhanlungen zur Kenntnis der Kohle von F. Fischer 5, 107, 108, Berlin, 1922.
163. Über Ligninsulfosäure und Lignin, S. 17, Göttingen, 1921.
164. The pentosan determination was carried out in a lignin prepared by 14 hours' treatment of wood with fuming HCl.
165. Über Naturprodukte, Hoenig-Festschrift, S. 10, Dresden-Leprig, 1923.
166. In dried, technically pure lignin; principally $SiO_2$·$Fe_2O_3$.
167. Hoenig-Festschrift, S. 28, 33.
168. Average of every four analyses.
169. E. Rump, Chemie und Struktur der Pflanzenzellmembran, S. 28 bzw. 25, Berlin, 1914.
170. Beiträge zur Kenntnis der chemischen Zusammensetzung des Fichtenholzes, S. 27, Berlin, 1911.
171. According to E. Rump, referred to elsewhere.
172. J. Koenig and E. Rump, Chemie und Struktur der Pflanzenzellmembran, S. 67, Berlin, 1914.
173. Stackmann, Studien über die Zusammensetzung des Holzes. Dissertation, Dorpat, 1878.
174. Koroll: Quant. chemische Untersuchung über die Zusammensetzung des Korkes, Bast-, Sklerenchym- und Markgewbes. Dissertation. Dorpat, 1880.
175. Fr. Schulze, Festschrift zur 400 jährigen Jubelfeier der Universität Griefswald: Beitrag zur Kenntnis des Lignins und seines Vorkommens im Pflanzenkörper, Chem. Zentralbl., 1857, 21, 321.
176. Henneberg, Beiträge zur rationellen Fütterung der Wiederkäuer II, 364 and 376.
177. Landw. Vers.-Stationen, 1870, 13, 22.
178. Above reference, 1880, 25, 222; 1882, 27, 387.
179. Neue Versuche über die Ausnutzung der Rauhfutterstoffe durch das volljährige Rind, Journ. d. Landw., 1867, 1.
180. R. Murdfield, Das Lignin und Cutin in chemischer und physiologischer Hinsicht. Dissertation, Münster, i. W., 1906.
181. A. Fürstenberg, Das Verhalten der pflanzlichen Zellmembran während der Entwicklung in chemischer und physiologischer Hinsicht. Dissertation, Münster, i. W., 1906.

## Rot-Proofed Lumber

Two very interesting booklets have recently been issued by the American Wolmanized Lumber Company, of Elizabeth, N. J., on the subject of rot-proofed lumber. These booklets contain most essential information for every mill man and in concise form treat on the subject of decay and rot of lumber, which cause heavy sustained expense in structural lumber over a period of years. The information imparted indicates how this situation can be corrected, and decay and rot of lumber completely eliminated.

## The Chemistry of Wood

Holzchemie. Erik Hägglund. Leipzig, Akademische Verlagsgesellschaft, M. b. H. 1928. 275 p.

The interest in the chemistry of wood is indicated by the fact that within the past two years two American books (Schorger, "Chemistry of Cellulose and Wood," and Hawley and Wise, "Chemistry of Wood") have appeared. Naturally these books pay particular attention to the woods peculiar to the North American continent. Now we have a work (in German) which stresses the results of German and Scandinavian workers. The scope of the work is clearly indicated by the chapter headings. I, Wood tissue. II, Physical properties of woods. III, Constituents of wood and their chemical properties. IV, Digestion of wood by acids; saccharification of wood. V, Digestion of wood by solutions of sulphurous acid and sulphites; the sulphite process. VI, Digestion of wood with aqueous alkalies. VIII, Chemical processes in carbonizing wood. X, Behavior of wood upon ageing and towards certain reagents. XI, Synthesis of wood in nature.

Chapter II discusses the volume weight and water content of woods and the relation between the two. Chapter III concerns itself with the well known constituents of wood, cellulose, hemicelluloses, lignin, resins, terpenes, fats, nitrogen-containing products, tannins, dyestuffs and ash content. Considerable space is devoted to the discussion of the methods of isolation, determination and constitution of these substances.

The proximate analysis of several woods are given, the results being taken from the work of Schwalbe and the Forest Products Laboratory.

The chapter on the sulphite process is devoted to a chemical discussion of the changes produced in wood by sulphurous acid and consists mainly of a review of the author's own work. The chapter on the alkaline digestion of wood is likewise largely a review of Scandinavian experiments. Since most of this work has appeared in rather inaccessible journals, this German summary is very welcome.

Chapter VII discusses briefly the so-called "Keebra" process, the use of chlorine and that of nitric acid. Chapter IX is of interest as showing the effect of the age of a tree upon the composition and yield of pulp therefrom.

Many references are given to the original literature, though, as indicated above, much of this is not very accessible to the American investigator.—C. J. West.

## A Memorable Relic

The St. Croix Paper Company, says the St. Croix Paper Company, Woodland, Me., is the recipient of a large bell from a paper manufacturer of Berlin, N. H. This bell, which weighs 4800 pounds, tolled for years from the tower of No. 4 Mill of the Glen Manufacturing Company, which later became the property of the International Paper Company.

Some of the organizers of the Glen Manufacturing Company later became identified with the St. Croix Paper Company, and the inscription upon the bell is a fitting memory of the late Messrs. John L. Hobson, Henry M. Knowles and Isaac B. Hosford, who were among the pioneers of both companies.

The bell is now in storage at No. 2 Store Room, where it will remain until George E. Kent decides upon an appropriate site for its permanent location.

The following is inscribed upon the bell:

"The Consumption of Paper is the Measure of a People's Culture."

The Glen Manufacturing Company,
Berlin Falls, N. H.
Organized 1885.
Number 4 Mill Erected 1891.
John L. Hobson
Henry M. Knowles
Dudley Porter
Isaac B. Hosford
Charles D. Porter

# Technologists Club Meets at Kalamazoo

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., April 16, 1928.—The fifth regular meeting of the Paper Technologists Club was held at the Columbia Hotel on the evening of Wednesday, April 4, 1928. Dinner was called at 7:00 P.M. At the conclusion of the dinner at 7:45 P.M., the chair made several anonuncements, including the death of Rudolph Hueckler, late of the Eddy Paper Company of Threee Rivers, Mich., and also introduced J. Wettermann, who has joined the ranks of the chemists at the Allied Paper Company.

Carl Schneider read correspondence from Mr. Whittington in which was outlined the obvious growth of our group and the necessity of meeting monthly instead of bi-monthly in the event that we wished to continue the growth of the organization and broaden the scope of the subjects to be discussed.

It was moved by Mr. Whittington and seconded by Mr. Bradford to have twelve meetings per year in the future, holding alternate meetings either in the office of the local paper mills or at the homes of chief chemists, these meetings being informal, without dinner, further, that all future meetings be held on the second Wednesday of each month. This motion was carried.

The chair announced that in accord with Mr. Heinmuuller's suggestion after the reading of the paper of the principal speaker of the evening, there would be a five-minute recess before the organized discussion started.

The chair announced a joint meeting in May at the Park American Hotel of the Superintendent's Association, Cost and Technical Association and the Paper Technologists Club.

The chair announced that plans were under way for a half day's excursion by members of the club to the Muskegon sulphite and sulphate mills some time during the middle of April.

Mr. Davey, chairman of the program committee, announced the following subjects as topics for the future meetings.

May—Foam Troubles, by Davey.

June—Oxycellulose, by Schneider.

July—Curling, by Bardeen.

August—Annual elections followed by five minute talks by each member present.

September—Colors, by Cattrell.

October—Joint meeting—Freeness, by Libby.

The chair then appointed three new committees as follows:

Committee for the Testing of Pulp: Harry Bradford, chairman; Frank Libby, Carl Schneider, Harold Stoll.

Committee for Converting of Old Papers: Charles Barton, chairman; Elbert Milham, Kent Kidder, Herbert Davey, H. S. Harham.

Committee on Co-operation: V. S. Heinmuller, chairman; Elbert Milham, Frank Libby.

Mr. Lundbeck then presented an admirable review of the outstanding features and points of interest noted during his recent visit to the TAPPI convention in New York. It was moved by Mr. Bradford, seconded by Mr. Dreshfield and carried unanimously that a vote of thanks be given to Mr. Lundbeck for his preparation of this report.

It was moved by Mr. Bradford and seconded by Mr. Whittington that a committee be appointed to investigate the possibility of securing for Kalamazoo a sectional convention for the members of the Central States, of the Technologists Club, the Superintendents Association and the Cost and Technical Association. This motion was carried and the following committee appointed: Harry Bradford, chairman; Frank Whittington, Arthur Dreshfield.

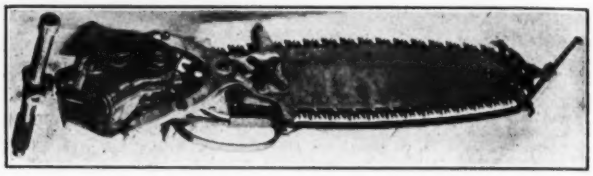
The principal paper of the evening was presented by F. J. Loeffler of the United Chemical and Organic Products Company of Chicago. His topic was "Glue, its manufacture and use in the paper industry." In this paper, he covered in a simple manner the methods of manufacture of bone and hide glues from raw material to finished product. He described the methods of test for bloom, viscosity, foam and odor. The paper was well presented and after the recess following the paper, the general discussion brought out many valuable points.

An announcement was made that the next meeting of the club would be without a dinner, at the office of the Rex Paper Company at 7:30 P.M. on the second Wednesday in May.

## Portable Sawing Machine

The Reed-Prentice Corporation of Worcester, Mass., which brought out the Wolf Portland Timber Sawing Machine last year, has announced this tool in a new type using an Ingersoll-Rand type A air motor. The demand for this form of drive by contractors, railroads, etc., has been responsible for this development, and it is now in successful operation on a number of jobs.

Large savings as high as $40.00 per day have been made with this machine by contractors, railroads, loggers, timber treating



NEW TYPE PORTABLE SAWING MACHINE

plants, lumber yards, public utilities, etc., and it has already been used to a depth of twenty-four feet under water, for cutting piling. Any operation handled with ordinary cross-cut saws can be speeded up with the Wolf saw.

This machine has a capacity up to timbers 24 inches in diameter, and weighs 95 pounds. A minimum of 80 pounds pressure and a volume of 70 cubic feet per minute is necessary to insure satisfactory operation, and at 90 pounds pressure it will cut a 12 x 12 fir timber in forty seconds. Hard woods are handled almost as quickly.

## New Paper Mill Roll Manual

An exceptionally useful and comprehensive manual for paper makers has been published by the B. F. Goodrich Rubber Company, manufacturers of rubber products for the paper industry, of Akron, Ohio.

The manual is profusely illustrated and is a complete encyclopedia on the Application of Paper Mill Roll Covers. Factors which determine the proper roll density for different presses on various types of Fourdrinier machines are explained at considerable length.

Chapters are also devoted to Top Press Roll for First Press Nine Point Straw; Machine Conditions Affecting the Life of Press Rolls; Aluminum Breast Rolls, Table Rolls, Wire Rolls and Felt Rolls, Covered by Vulcalock Process; Density Designation; Press Roll Grinding, and Crowning of Rubber Rolls.

The manual also contains numerous tables and charts of undoubted value to the paper maker and comprises a wonderful compendium of useful information to the industry.

## Canadian Forestry Convention in June

WASHINGTON, D. C., April 11, 1928.—The annual convention of the Canadian Forestry Association will be held in Fredericton, New Brunswick, Canada, on June 19 and 20, according to a report from Vice Consul Frederick C. Johnson, Fredericton, made public by the Department of Commerce. The purpose of the Association, the report states, is to deal with conservation problems, reforestation and the preservation of the forest wealth of the Dominion.

In preparation for the event, a Provincial Committee has been appointed by the Provincial Minister of Lands and Mines.

Section of the

# COST ASSOCIATION OF THE PAPER INDUSTRY

*Affiliated with*

THE AMERICAN PAPER AND PULP ASSOCIATION

Edited by
THOS. J. BURKE, C. A., Sec.-Treas.

# Costing Problems in Pulp and Paper Industry *

By J. H. Wilkie, Auditor, Price Bros. & Co., Ltd., Quebec

When I was asked to read this paper I had a certain amount of diffidence in accepting the invitation. It appeared to me to be a case of bringing coal to Newcastle for an outsider to come and talk about costs to the Cost Accountants' Association of Canada. Yet on reflection it occurred to me that Newcastle was a good place to go to discuss coal in the abstract, so I am here today.

The moving picture you have just seen is a fair representation of how woods operations are conducted and news print paper is manufactured today. At the request of your Executive I will endeavor for the benefit of those who are not familiar with the industry to give a short sketch of our operations from their initial stages in the bush to the finished product at the paper mill.

The woods used in the manufacture of news print are mainly spruce, balsam, fir, birch and a small quantity of jack pine.

The almost general practice of the companies engaged in the industry is to employ contractors known as "jobbers" to cut and haul the logs or pulpwood to the bank of the river. Owing to the keen competition for woodsmen and jobbers because of the immense increase in the production of paper, experiments have been made by several companies cutting their own wood on a small scale, but so far as I am informed the costs have not led them to adopt this policy generally. Besides, it would involve a considerably increased capital expenditure for camps, horses, sleighs and other equipment.

### Government Regulations

Government regulations, which vary in each province, have to be observed. These are framed, generally speaking, with the idea of conserving the wood supply. Trees under a certain diameter being left to grow and provide a future supply. Trees of a large diameter are felled by two men using a cross-cut saw, but in the case of the smaller timber, which is usual in our northern forests, the axe is the more handy implement. After removing the branches, the logs are sawn into whatever lengths will suit for driving in the spring—four, twelve, or sixteen feet. The logs are then skidded out to the logging roads and thence they are drawn either by horse or tractor to the banks of the rivers or streams, down which they are to be driven to the mills.

At the breakup of the ice in the spring the wood is then driven down the rivers with the aid of the usual freshet.

During the progress of the drive it may happen that the bark will be taken off the pulpwood by friction or otherwise, but it generally reaches the mill in its unbarked condition. The first mill operation, therefore, is to remove the bark. Logs are run from the boom on a conveyor or jack ladder and long logs are run to a slasher, where circular saws cut them into short lengths. These lengths are then fed into a barking drum, a long cylindrical device, in which the logs are tumbled against one another as well as against the rough surface of the drum and the bark is removed by friction. This process is economical because it removes only the bark and practically none of the wood.

The two main ingredients of news print paper are ground wood and sulphite pulp in the proportions of approximately 75 per cent and 25 per cent, respectively. Both are manufactured from pulpwood as it leaves the barking drum but by entirely different processes.

### Ground Wood Pulp

Ground wood pulp is made by simply holding a bolt of wood by hydraulic pressure against rapidly revolving grindstones. These grindstones usually have a fifty-four inch face to grind four-foot logs, and it takes about 1,000 hp. to drive each grinder, and twenty-four hours' continuous grinding will produce from ten to fifteen tons of good pulp.

While the wood is being ground water is introduced into the grinder to assist in making the pulp and as a cooling agent to reduce heat created by the friction.

The mixture which comes from the grinders is called "slush." This slush is transferred first to bull screens, which removes splinters and knots and then to rotary screens for removal of coarse pulp. It is then pumped to thickening machines called "deckers," in which a cylinder fitted with wire mesh revolves in a vat of pulp. The top of the cylinder is higher than the contents, and as the cylinder revolves the water in the pulp passes from the inside of the cylinder, leaving a thin layer of pulp on the outside. This is removed, completing the ground wood manufacturing process.

"The pulp is then held ready to be mixed in correct proportion with sulphite pulp.

### Sulphite Pulp

Sulphite pulp is made by first reducing logs to small chips instead of grinding the wood to a pulp as in the case of ground wood pulp. This is done by a rotating steel disc, the surface of which is set with sharp knives radiating from the center. The chips are screened and carried on a wide belt to digesters (large vertical cylinders), in which they are reduced to chemical pulp

* An address before the Canadian Society of Cost Accountants' Second Annual Convention, Montreal, Sept. 9, 1927.

by being cooked under steam pressure in an acid consisting of bisulphite of lime. When the cooking process is completed a valve is opened at the bottom of the digester and the pulp is discharged into a blow pit, where it is screened and washed, leaving pure fiber or cellulose ready for mixing with ground wood pulp.

The two grades of pulp in correct proportions are then pumped to the mixing tank, where water is added until the mixture is about 1 per cent pulp and 99 per cent water. Here also the requisite color and alum, which fixes the color and helps to give a good finish to the paper, is added. This mixture is passed through a machine known as the Jordan Engine, which refines it by a delicate manipulation that produces the utmost uniformity of fiber. The resultant stock is pumped to the stock chest, which is the reservoir for the paper machine. It then passes through a fan pump and through screens into a box placed at the head and across the full width of the paper machine.

### The Fourdrinier Machine

The type of paper machine in general use is known as the "Fourdrinier," invented by Louis Robert in France in 1799, and first built and used in England by the Fourdrinier Brothers, who gave it its name. The machine has a wet end where the pulp goes in and a dry end where the paper comes out.

From the head box at the wet end of the machine the pulp flows evenly on to an endless fine mesh copper wire belt. The wire screen carries the pulp down a slight incline at a high speed with a lateral shaking motion, causing the pulp to settle down upon the screen in the form of a wet sheet ,and the water drains away through the wire. As the wire progresses it passes over several suction boxes the full width of the sheet, which removes still more of the water by a vacuum process.

When the pulp leaves the meshed wire screen it passes between two rollers, known as "couch rolls," the upper one of which is covered with felt, and gently squeezes more moisture out of the sheet against the lower roller. On the newest types of paper machines the upper roll is eliminated and the lower one removes water by suction.

Then the sheet runs on to a woolen "felt" and passes through a series of press rolls, which remove much of the remaining water. At this stage the sheet of paper still contains from 65 per cent to 70 per cent of water.

The sheet then passes over a long series of hollow iron cylinders, which are heated on the inside with steam, and complete the drying process before the paper passes through a vertical stack of smoothly finished steel rolls of smaller diameter, known as calenders, which virtually iron the sheet smooth and give the degree of finish desired.

As the sheet leaves the calender it is wound in a long roll of the length desired, being cut to the proper width during the rewinding operation and then wrapped up in heavy paper for shipment to consumers.

### Difficulties in Obtaining Costs

Before going into detail it might be well to make a few general observations on difficulties of obtaining costs in the pulp and paper industry. Insofar as the costs of the conversion of pulpwood into news print paper is concerned a uniform system of costing has been developed, chiefly through the initiative of the News Print Service Bureau, but this does not apply to the woodlands operations or to the measurement of pulpwood.

There is probably a greater lack of accuracy and uniformity in the measurement of wood than in that of any other basic raw material used in the great industries of the world. This has arisen from the fact that as originally instituted and still largely carried on, woods operations must be a rough and ready character, adapted to every climatic condition and every obstacle offered by the geographic configuration of the industry.

Long before it was dreamed that paper would be made chiefly from wood, logging operations for timber manufacture were developed on lines which suited the product and when papermakers turned to the woods for their raw material it was natural that old methods of woods operations should be continued, although these could well have been changed to meet new conditions. Owing, however, to the small extent of the utilization of wood for the manufacture of paper to begin with, and as no one foresaw the immense development of the industry, business practice designed for the lumber business was adapted to the paper business. I refer in particular to the log scales in common use throughout the country. Practically every Province in Canada and State in the United States has a different log scale. These are all of a more or less arbitrary character, and the product may vary ten to one hundred per cent from the amount indicated by the log scale, depending on size of timber and other factors.

But the fundamental difficulty is that the finished product is measured by weight, as likewise are the other ingredients of paper, whereas the principal raw material is measured by volume. Obviously then there can be no accurate checking of product against raw material and consequent determination of conversion losses when the raw material is measured by volume and the product by weight.

### Theoretically Correct Method

The theoretically correct method is to weigh all wood into the mill with sufficient sampling to determine the percentage of moisture it contains. Only in this way is it possible to know exactly how much wood fiber there is to start with and to check against it the amount that comes out in the form of pulp or paper. We are now seeking a device which will automatically weigh and record the weight of the chips of wood as they are carried along on a belt conveyor. Samples of the chips are frequently tested for moisture, and in this way the amount of wood fiber used to manufacture sulphite can be accurately and constantly known.

It is not so simple a matter to weigh and test wood which is used in the manufacture of ground wood, but the difficulties are not insuperable and good experimental results have already been obtained.

It is probable that before long we shall have methods of wood measurement which are a great improvement on our present practice.

However, to revert to present practice, logs are scaled in the woods in 1,000 board feet, according to the scale adopted by the Province in which the operations are being carried on. In Quebec Province pulpwood is cut by the cord of 144 cubic feet. These logs and pulpwood are transported to the mill by water or rail, then for mill operations the log scale is converted into cords, the conversion factor varying according to locality, character of timber and scale used. In Quebec 1,000 feet log scale is generally assumed to be equivalent to two cords of wood or 500 board feet per cord.

### Control of Pulpwood

The control of pulpwood is difficult because the measurement of quantities entering and leaving storage presents many complications. When wood is received at the mill by water the number of pieces is counted. The quantity in cords is then estimated from the count and from an average diameter calculated from tests. Where pocket grinders are used it is customary to rack the wood in trucks of known capacity, and the consumption is determined from the daily reports showing the number of trucks of wood ground.

Magazine grinders are equipped with an automatic registering device to estimate the number of cords ground. All these measurements are subject to variations in the cord itself, due to barking losses, different sized sticks, crookedness, rot, uneven racking in trucks or inaccurate registering by the magazine grinder recording device. Most companies have their block piles surveyed at intervals by engineers, and use a converting factor determined by chemical analysis and based upon experience as a check on the consumption figures calculated by other means. This conversion

factor does not take into account what may be recovered from by-products. For every ton of news print manufactured there are over 900 pounds of waste, about half being solids and the other half soluble. Part of these by-products is now being used, and research work is being carried on with a view to further utilization.

### In the Woods

Now let us return to the woods. We will begin at the beginning, namely, the getting the wood cut and delivered on the bank of the river to be driven to the mill.

It having been decided to have the wood cut by contract, this can be done in two ways: (1) Give out the whole cut to the jobber, who is generally known as a Grand Jobber, the cut being governed by the requirements of the mill or mills, which might range from 50 to 150 million feet, or (2) divide the cut up between a large number of small jobbers in contracts not exceeding two million feet, the majority of them being less. In the case of the grand jobber he does no actual cutting himself, but sublets his contract to a number of small jobbers. He, however, runs his own commissariat, which helps to swell his profit or reduce his loss. Should any of his sub-jobbers fail to make good the grand jobber will take a mortgage on anything tangible the sub-jobber owns and in this way keeps hold of his man until he has liquidated his indebtedness. On the other hand, he may have sub-jobbers who make money, and these come to look to the grand jobber for a sub-contract each year. From some companies' point of view their experience with grand jobbers has not been fortunate, as without strict supervision by a reliable staff there has been found to have been collusion between the jobber and the culler, who measures the wood, and in some cases it has been discovered that the quantity of wood supposed to have been cut and delivered on bank was grossly overstated.

In the case of the small jobber it is found that supervision of his cut and his financial standing can be more easily maintained. It also has disadvantages in that we have to furnish the commissariat ourselves, tieing up a fairly large amount in stock, and when we get an incompetent jobber and we see him going steadily in the hole through incompetence his contract has simply got to be canceled and we have to stand the loss. Whilst grand jobbers can afford to take mortgages from the small one, a large corporation, while it may have the same right in law, cannot afford to offend local sentiment in that manner.

### Must Fix a Price With a Profit

Whether we get out our wood by small jobbers or grand jobbers we have got to fix a price which will give us wood at an economical figure and insure a profit to the jobber which will satisfy him. In the past this has been done mainly by the instinct or guess work of the manager based on previous experience, but did not work well, as it was found that in the case of two competent jobbers one might have made a large profit and the other, owing to conditions over which he had no control, had given his winter's work for nothing. It was, therefore, found necessary to analyze the operations of each jobber. We, therefore, have to find out what plant, implements, horses, sleighs, etc., the jobber brought with him at the commencement of the contract and what he took away with him at the end, the cost of fodder and provisions consumed during the term of the contract, the time worked by men and horses, mileage of hauls, and wages paid his men, and, of course, his credits for logs delivered on bank are known to us. In this way we find out what every man and every horse did every day in all the camps. In addition actual forest and weather conditions are taken into account, and we are gradually becoming able to regulate prices by translating labor values and food consumption back into money. Our main difficulty in this work is in getting the proper type of man to collect the data we require in the bush. Bush organization is really the solution of this problem.

### Culling

The timber in the bush is measured by cullers, who are licensed by the Government, and are appointed by examination. Owing, however, to its only being a winter job the trade or profession does not attract a large number of competent men. To check up these men, therefore, we have check cullers whose business it is to test the work of the ordinary cullers. As it is on the measurement of these men that the jobbers are paid and the stumpage charged for, we endeavor to give them employment all the year round, but owing to the recent large demands for these men it is difficult to hold them.

Then comes the drive.

Perhaps I might be permitted here to cite a case where an improvement in the old methods of driving logs in a river was discovered accidentally. The majority of you probably know that the usual method of driving logs which do not go down with the ice is to store as much water as a dam will hold and then release it all at once in the hope that the rush of water will take down all the logs. Whilst this was in progress the stream might overflow is banks and leave a large number of logs stranded. Some years ago owing to the construction by the Government of storage dams for hydro-electric purposes, they have deemed it necessary in some cases to restrict the flow of water during the driving season. We were notified by the Department of Forests and Streams that we would only be allowed about a third of the amount of water that had in former years flowed during the driving season, the remainder being required for a power development during the dry summer season. Notwithstanding our protests that such would be entirely insufficient we could not move the Department, but the drive was completed by releasing the water from the dam, using a gradually rising flow. I may add that this method of driving is being extended to all our other rivers, and they uniformly show a reduction in labor costs.

The main problem so far as the drive is concerned is the allowance made for loss by sinkage and rafting. Price Brothers are fortunately situated in that all our rivers can be driven in one season. Some companies have two, three and even four years elapse before the logs on bank reach the mill. Under these circumstances a comparatively large allowance must be made for sinkage. Sometimes it may for various reasons be advisable to leave some logs undriven, or again they may be left in the river because they will not be required in the mill before the following summer, and these factors would, of course, tend to increase the proportion of sunken logs, but the allowance we make, 10 per cent of the cut, we find to be more than ample in view of the data collected.

### The Question of Sinkage

The chief factors which enter into the question of sinkage are:
1—Species of wood whether spruce, balsam, birch or jack pine.
2—Whether green, dead or burned.
3—Quality.

Then again we find two logs which to all outward appearances are smiilar yet one sinks and the other floats. Certain types of rot cause a log to sink, whilst another type assists it to float. It would also appear that certain parts of a log float better than other parts, as tops sink more readily than butts.

Then we have rafting operations in large bodies of water such as Lake St. John, but the loss there should be no greater than in a river except in cases of violent storms.

In order to drive logs economically it is often necessary to make what are termed river improvements such as flumes for carrying logs from one watershed to another, dams for storing water or diverting the water into particular channels so that the logs will not stick in the shallows, or dynamiting the bed of the river. It would be quite good accounting practice to write these off during the number of years that section would be operating, taking into account the volume of timber cut. Price

Brothers previously following this practice, but during the years of our affluence we wrote all these off and have since charged into operations the river improvements executed during the previous year.

### Fire Protection, Ground Rents, Etc.

Before leaving the subject of Costs I should also like to mention the expense incurred for fire protection, forestry, engineering, ground rents, and general overhead in connection with our limits. As some of you probably are aware, the company which I have the honor to represent has large holdings of limits. Considerable expense is involved in protecting the limits which are not being operated from fire, paying the annual ground rent of $8.00 per square mile, surveying the land, reafforestation and general overhead. Our practice is to charge all this against the current year's production, so you see that large holdings of limits are not an unmixed blessing.

Speaking generally, the standard methods of cost accounting in the news print industry have been demonstrated to be sound, and I venture to claim that at present it furnishes information to managers and executives which enables them to reduce costs and increase operating efficiency. As I indicated, there still remains, owing to the peculiar nature of the industry, much to be done, but we are making progress.

There is a problem, however, which I wish to take this opportunity of bringing to your attention. That is the situation on which the industry depends for its supply of raw material, which is far from being a satisfactory one. Everyone knows that the days of wasteful old time lumbering are over because the magnitude of the modern paper industry requires that our supplies of wood must be perpetuated for an indefinite period of time. It is a matter of supreme importance to conserve to the utmost the supplies of wood remaining on our timber lands and to provide for the re-growth after cuttings have been carried out. In other words, "wood mining" must be replaced by "wood farming." While it is true that Eastern Canada enjoys such favorable conditions for tree growth that expensive schemes of artificial reafforestation are unnecessary in the case of properly managed forests, yet a certain minimum of scientific management is necessary. The slow growth of timber entails the management making its plans for periods much further ahead, and, to tie up money for a much longer time than is necessary in any other business. After the present crop of trees has been cut and gathered in we do not expect to harvest another until eighty to one hundred years have elapsed. That being so, we are surely entitled to expect that we will obtain a return on any expenditure made on reafforestation or fire protection. The only way in which this can be done is to be certain that the timber lands on which we are spending money will remain in our successor's hands until the second crop is ready for the saw or axe. Without security of tenure and freedom from serious risk of fire forest operations cannot be conducted in a manner that will either safeguard the future requirements of industry or give the fullest possible return on the moneys invested.

Whilst limit holders' licenses are purchased without any period for their continuance being set they are renewable annually by Government, and are subject to cancellation if the licensee fails to abide by the regulations. Although the licenses themselves are annual the right to their renewal (subject to the licensee's obligations being performed) is perpetual. This view has never been seriously challenged.

### Licensed Land for Colonization

In spite of the permanence of the licensee's rights in other respects, licensed land is available for colonization purposes, and is regularly removed from licenses to be made over to settlers. Limit holders are not opposed to colonization, but rather wish to foster it if only in order to secure the necessary supply of forest labor. We recognize fully that the economic importance of agriculture is paramount, and that when forest land is converted to agricultural production a gain to the community results. What we complain of is timber speculation in the disguise of colonization or colonization so ill directed that it ends in failure. A large quantity of data with reference to the loss of timber limits by colonization has been collected and can be made available to anyone interested by the Quebec Forest Industries' Association. If you take the areas under licence to limit holders in the year 1906-7 and compare them with those held by the same limit holders in 1925-6 you will find that nearly all have sustained serious losses, some of them as high as 60 per cent.

Efforts have been made to confine colonization to cultivatable lands, and a scheme for the classification of all Crown Lands and the institution of permanent forest reserves on areas not required for settlement in view of their unsuitability for farming was put forward by limit holders to the present Quebec Government. This was accepted in principle, but political considerations appear to have made it inadvisable for the Government to carry it out.

Another factor which limit holders have to contend against is the loss of limits by fire. The disastrous fires of 1922 and 1923 awoke the Government to the extent that it reformed its protective service. The existing organizations both of the Government and of the Limit Holders' Protective Association are much superior to what they were in 1923, and more money is being spent and better spent than formerly, yet the situation remains unsatisfactory. Limit holders either have their own fire protective service or join together in associations to have this work performed.

The Quebec Government has also its service, but some of its methods are open to grave objection such as the payment of officials who supervise the burning of settlers' slash. These men's duty is to issue permits to settlers when necessary, but their salary is dependent on the number of permits they issue—so much a permit. It is only human nature for these men to issue as many permits as possible.

I noticed with interest an article calling upon the Federal and Provincial Governments to cease leasing timber limits owing to the over expansion of the industry, and this is timely but does not go far enough. The real trouble is that the Governments interested have no policy of continuity; they are too easily influenced by political considerations. No general scheme has been thought out and adopted for the management of Crown Lands either in respect to agricultural expansion or to forestry. Measures are taken from time to time, but not being based on any co-ordinated plan, are open to the influence of political opportunism, and never reach the fundamental factors, namely, security of tenure and fire.

### Government Policy

It is necessary, therefore, for the Government to adopt a policy which should embody the following main features:

1—All Crown Lands to be classified immediately in a wholesale manner and divided into three categories, namely, agricultural, potentially agricultural, and non-agricultural, the last named category to be set aside as permanent forest reserve, i.e., ear marked for wood production in perpetuity. This will bring security of tenure on which such other reforms as improvement in silviculture and management will follow.

2—Further industrial development in the Pulp and Paper trades to be regulated in accordance with the ascertained supply of raw material. This process is, of course, implied in a comprehensive scheme of permanent forest reserves and is of extreme importance for the safeguarding of established industrial concerns, particularly in view of a commonly current belief that large areas of unleased pulp wood lands still remain available. This belief is not shared by the trade which fears that comparatively few unburned tracks now remain which are suitable for this purpose either as regards extent or density of stocking.

**Discussion**

MR. LORTIE: Gentlemen, the speaker is willing to answer any questions that may be put to him by the meeting.

MR. TURNER: I should like to ask a question of Mr. Wilkie. He suggested that the proprietors of the timber limits should be secured for the expenditures now being made, the fruits of which will not be apparent for eighty or a hundred years. Do we conclude that the proprietors of these limits contribute to the Canadian Government, a capital sum, for the limits which they now hold—in other words, do they buy them from the Canadian Government?

MR. WILKIE: We did not buy them outright, but we pay a big sum down, perhaps five hundred thousand dollars, for a certain stretch; in addition, an annual ground rent of eight dollars per square mile; we also pay stumpage on all the wood cut.

MR. TURNER: That answers my question, but, applying that fact to the argument that your company should be secured for its expenditure, eight dollars a square mile does not seem a great deal to pay.

MR. WILKIE: Our stumpage, last season, amounted to a very large sum. In addition to that, we paid ground rent.

A MEMBER: What would stumpage cost?

MR. WILKIE: It depends on the specie of wood, and whether it is "burned" or "green." For pulp wood, $2.70 per thousand, and for "unburned" wood, $1.75. I may add that, for wood used for lumber, we get a rebate of seventy cents per thousand feet.

A MEMBER: The leases which you have—are they for stated periods, or perpetual?

MR. WILKIE: There is no period of time mentioned, but they are subject to our fulfilling the obligations mentioned in the leases. It is conceded by the best legal opinion—the point was never raised—that the leases are in perpetuity, so long as we pay the ground rent.

MEMBER: But, it is a form of lease—it is not a freehold?

MEMBER: Your lease would extend until you cut that tract of land?

MR. WILKIE: Also after that, provided we continue paying ground rent—until the next crop, of course. Spruce will grow to pulp, under favorable conditions, in forty years, but we base our calculations on average conditions; we think it will take eighty to a hundred years before we get another crop.

MR. TURNER: Do you capitalize the expenditure and make allowance for the next crop?

MR. WILKIE: No, we charge it to this year's crop. That is our custom. I don't know what other concerns do. We charge all our expenditures on reafforestation, exploration and fire protection, to our current years' cut.

A MEMBER: In keeping track of your wood operations, do you keep track separately of each operation, showing the cost of hauling, scaling, etc.?

MR. WILKIE: Yes.

MEMBER: And you subdivide them to the territory you are in, long hauls and short hauls?

MR. WILKIE: Yes.

MEMBER: You get the returns out, after the operation?

MR. WILKIE: After the completion of the current season.

MEMBER: Do you find it valuable?

MR. WILKIE: This is only in its infancy. The managers think the data we are collecting is valuable. We don't wish to dogmatize on our results, so far, but it shows promise.

MEMBER: I may state, that our company, the Howard Smith Company, of Gaspe, came to the conclusion that it would hardly be worth while to keep track of the detail operations, because, one year we may have a long drive, and another, a short drive; one year we may have ten feet of snow, and another two feet.

MR. WILKIE: We keep track of that also. We are inclined to the opinion that this system is valuable; we are finding it so. The old method of guess work was not found satisfactory.

MEMBER: Do you have small jobbers, or, one big jobber?

MR. WILKIE: We operate with small jobbers. Occasionally, in burnt wood, we have given out a contract for about ten thousand feet to a Grand Jobber.

MR. LORTIE: How much do you figure you could save, by practical cost accounting, if it could be done?

MR. WILKIE: I am not prepared to answer that question, because of the difficulty to get Cost Accountants to go and stay in the woods.

MR. LORTIE: But, can you give us an estimate?

MR. WILKIE: I cannot answer that. We have great difficulty on getting good men, both in operation and clerical work, to stay in the bush; they may stay a year or two, but the percentage is small; they get tired of the woods after a couple of years. Of course, there are exceptions. We only have about ten or twenty per cent who remain.

M8. LORTIE: I have heard the statement made, on one occasion, that for one dollars you can get fifty cents worth of work, and with that you are well satisfied?

MR. WILKIE: It all depends on supervision, efficient supervision by the Woods Manager; that is really the key.

MR. LORTIE: It is not a question of cost; it is a question of supervision?

MR. WILKIE: If there is good supervision, we can get the cost.

A MEMBER: In arriving at the cost of your logs at the mill—in the summertime all the work of your men is preparatory to the drive—do you include that to get the cost per thousand feet laid down at the mill?

MR. WILKIE: In the last season's run?

MEMBER: You start off with your drive, taking the total drive when this is driven to your mill, how do you arrive at the quantity going into the mill, in order to get your yields?

MR. WILKIE: This quantity is not credited to the Wood Department until it goes into the mill.

MEMBER: You said you allowed ten per cent less?

MR. WILKIE: Yes, on the sinkage. They allow that right away. During the years, we have been accumulating quite a reserve.

MEMBER: How do you inventory the logs lying outside?

MR. WILKIE: The engineers make an estimate. As I said, I think the only way we can arrive at our conversion losses is, by measuring the wood going into the mill.

MEMBER: But, you allow ten per cent in your calculations coming down the river, and then it is pretty hard to gauge the amount of logs?

MR. WILKIE: We have made no change so far. Possibly, if we ever clean up the river, we will be able to arrive at a much closer estimate, but, we know, from the experiments we have made, that ten per cent on the drives which we make in the Kenogami District would be about right.

A MEMBER: May I ask, in charging your wood, from your woodpile, into the mill, do you use an arbitrary figure?

MR. WILKIE: We keep track of the wood that goes into the groundwood mill, and we reckon a cord of wood per ton of groundwood; in sulphate it takes about 1.8 cords. We take a chemical analysis, and the composition of the paper is, so much sulphate and so much groundwood; we check these figures with our other check. We count the stuff that goes into the sulphate mill and into the groundwood mill, and we check that against the analysis.

In the small grinders they have a contrivance, and in the large grinders they have an automatic device, which tells you the number of cords, but these are only used as checks.

PROF. THOMPSON: Mr. Wilkie, we have all listened to your very informative address with a great deal of pleasure.

## Arthur E. Ham & Sons' Worthy Week

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 16, 1928.—About 300 from Boston and vicinity, as well as Brockton and Worcester, visited the offices of Arthur E. Ham & Sons in the Rice Building, 10 High street during Worthy Week, April 9 to 14, inclusive, to see the exposition of printed specimens on the beautiful papers made by the Worthy Paper Company. The specimens were arranged most attractively and artistically. In addition to the colorful and appealing wall display, tables offered a leisurely study of the collection of brochures and books in which Worthy Papers have been effectively used. Every known process of printing from a small advertising folder to portfolios and books worth hundreds of dollars was shown. The assortment from the mill's library was remarkable, many specimens expressing the modern spirit in advertising art, while others showed the more restrained, but always effective use

EXPOSITION OF ARTHUR E. HAM & SONS

of typography and decoration in folders, books, broadsides and business stationery.

The lines featured were Signature, Georgian, Marlowe, Daciam, Hadrian, Roxburghe, Aurelian and Nubian.

The exposition was held with the cooperation of the Worthy Paper Company. Arthur E. Ham & Sons (Arthur E. Ham, Herbert C., James L., and A. Lawrence Ham) were assisted in this service to their friends by Edgar S. Bliss, Fred W. Main, and Gorham Bliss, representatives of the Worthy Paper Company.

As a result of the display several new propositions were started by customers with Arthur E. Ham & Sons.

## SATISFACTORY DEMAND IN TORONTO

(*Continued from page 36*)

were unable to estimate the loss, but pending a survey of the damage, operations at the plant were suspended for some days. Records kept in the business office were saved. The cause of the fire is unknown.

E. C. Martin, formerly of the Interlake Tissue Mills head office in Toronto, where he was sales manager, has been appointed general sales manager of the Saranac Pulp and Paper Company, of Plattsburg, N. Y., and the Independent Paper Mills, Inc., of New York. The direction of the sales of the two companies will be from the mills at Plattsburg.

A visitor to Toronto this week was Louis Lemieux, of the sales promotion department of the Canadian Pulp and Paper Association, Montreal, who was in the city calling on various sections of the paper trade.

Robert Rolland, of the Rolland Products Company, Detroit, greeted many old friends in Toronto this week. Mr. Rolland was formerly the Toronto representative of the Rolland paper with offices in the Bank of Hamilton Building, Yonge street.

John Hewitt, Jr., and T. J. Allen, of Paper Sales, Ltd., King street, have returned from a visit to the Kenogami and Jonquiere mills in Quebec of Price Brothers & Co., Ltd. They also spent a few days in Quebec City. Mr. Richards, of Louis De Jonge & Co., New York and Chicago, was a caller on the Toronto Paper Trade this week.

Among the paper men calling on the trade in Toronto this week were Joseph Chenevert, sales manager for the Wayagamack Pulp and Paper Company, Three Rivers, Que.; C. H. Fetherstonhaugh, sales manager of the J. C. Wilson Co., Ltd., Montreal, and Will Howe, of Hobbs & Howe, Buffalo.

K. S. Maclachlan, general manager of the Lincoln Pulp and Paper Company, Merritton, Ont., received the congratulations of many friends this week the occasion being the arrival of a little daughter at his home.

The Interlake Tissue Mills, Ltd., Thorold, Ont., have just had printed a particularly striking line of window display cards in the line of a Parisian dancing girl amid an ensemble of colored discs. The cards have been done in six colors and illustrate the 37 different shades of Interlake Superfine Crepe. The company are putting on an extensive advertising campaign in connection with their toilet and tissue lines, using display cards and periodicals.

Ivan Moffit is now the executive secretary of the Canadian Paper Trade Association, which organization now has its offices on the fifth floor of the York Building, corner King and York streets, Toronto. Mr. Moffit was formerly with N. L. Martin, assignee and chartered accountant, who for years has held the secretaryship of the Canadian Paper Trade Association, with Mr. Moffit as his assistant. The latter has now taken over entire charge of the work with a separate office and excellent qualifications for the duties of the position.

The drive of pulpwood from points along the Medway River in the vicinity of Caledonia has started for the pulp mill at Charleston. About 1,000 cords have cleared Brookfield. This will combine with 3,000 cords at Greenfield. These cuttings represent substantial profits to many holders of small pulpwood lots.

J. C. McLellan, construction engineer of the Backus-Brooks Company at Fort William, Ont., was injured while walking about the scene of construction a few days ago. Suffering the fracture of a leg in a fall he was taken to hospital where he will be laid up for several weeks.

## Waste Material Blue Book

The National Association of Waste Material Dealers, Inc., has just published its Fifteenth Anniversary Blue Book, which contains a wealth of information of exceptional interest to its members and to members of the paper industry. G. H. Rady, president of the association from 1927 to 1928, contributes an interesting "Foreword."

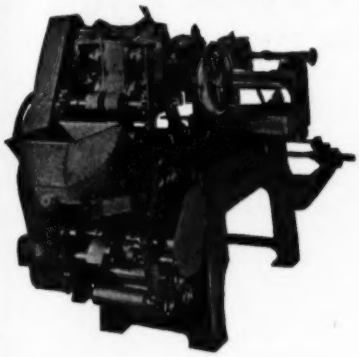
The formation and remarkable growth of the association is described at considerable length. Chapters are devoted to the Rules for Arbitration, Constitution and By-Laws, Association Activities and Services to Members, General Trade Customs, etc., etc.

Of particular value to the paper industry are the sections devoted to paper mill supplies and the various approved classifications.

## To Meet in Montreal or Toronto

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 10, 1928.—Following on the decision of the Abitibi Power and Paper Company to move its head offices from Montreal to its mill site at Iroquois Falls, Ont., it is stated in the papers here that for the future the annual meetings will be held in either Montreal or Toronto.



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***Special Machinery Designed and Built***

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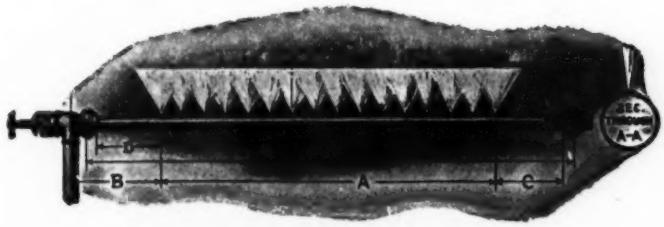
**1702 Robinson St., South Bend, Ind.**

## THE "RAINSTORM" SHOWER PIPE

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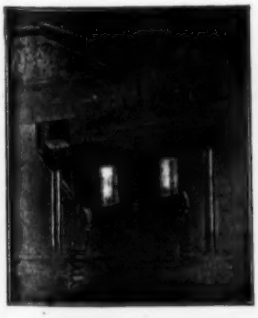
**BUILDERS OF DEPENDABLE MACHINERY FOR THE PAPER MILL**

**The Undercut Trimmer**

**Die Cutting Presses**



## TYPE "B" IRON EXTRACTOR *for* PAPER MAKING

It consists of special magnetic surfaces of great power over which the paper stuff is made to pass. As a result, all the iron and many other foreign substances are completely extracted. Hundreds of these devices are in use daily and no one of them has failed to give complete satisfaction. Write us for Bulletins and full data.

**THE ROLAND T. OAKES CO., Holyoke, Mass.**

*Electrical Specialists.* *Established 1885*

# Imports of Paper and Paper Stock

## NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

## NEW YORK IMPORTS

WEEK ENDING APRIL 14, 1928

### SUMMARY

Cigarette paper .....1,940 cs.
Wall paper .....70 bls., 7 cs.
Paper hangings .....50 bls., 14 cs.
Painted paper .....2 cs.
News print .....949 rolls
Printing paper .....616 rolls, 149 cs.
Wrapping paper .....20 rolls, 113 cs.
Packing paper .....20 bls., 17 cs.
Tissue paper .....18 cs.
Tracing paper .....5 rolls, 1 cs.
Baryta coated paper.....96 cs.
Surface coated paper .....161 cs.
Gold coated paper.....6 cs.
Metal paper .....30 cs.
Coated paper .....15 cs.
Decalcomania paper .....21 cs.
Parchment paper .....4 bls.
Stencil paper .....78 cs.
Pergamyn paper .....38 cs.
Litho paper .....95 cs.
Drawing paper .....45 cs.
Filter paper .....195 bls., 16 cs.
Envelopes .....21 cs.
Letter paper .....8 cs.
Colored paper .....9 cs.
Aluminum paper .....8 cs.
Glazed paper .....4 cs.
Straw board .....529 rolls
Miscellaneous paper .....185 cs.

### CIGARETTE PAPER

The Surbrug Co., Sarcoxie, Havre, 20 cs.
Standard Products Corp., De Grasse, Havre, 30 cs.
De Manduit Paper Corp., Collamer, St. Nazaire, 690 cs.
American Tobacco Co., Collamer, Bordeaux, 1,200 cs.

### WALL PAPER

F. A. Binder, Karlsruhe, Bremen, 27 bls.
C. A. Haynes & Co., Caronia, Liverpool, 3 bls.
W. H. S. Lloyd & Co., Caronia, Liverpool, 1 ble.
F. J. Emmerich, Ausonia, Southampton, 3 bls.
F. J. Emmerich, Albertic, Liverpool, 5 bls.
F. J. Emmerich, Minnekahda, London, 9 bls.
F. J. Emmerich, Westphalia, Hamburg, 13 bls., 3 cs.
W. P. Nelson & Co., Westphalia, Hamburg, 2 cs.
A. C. Dodman, Jr., Inc., Homeric, Southampton, 9 bls., 2 cs.

### PAPER HANGINGS

A. C. Dodman, Jr., Inc., Caronia, Liverpool, 15 bls.
W. H. S. Lloyd & Co., Minnekahda, London, 35 bls., 9 cs.
Hudson Freight Forwarding Co., France, Havre, 1 cs.
A. C. Dodman, Jr., Inc., France, Havre, 1 cs.
Whiting & Patterson Co., Inc., Homeric, Southampton, 3 cs.

### PAINTED PAPER

F. J. Emmerich, France, Havre, 2 cs.

### NEWS PRINT

H. Reeve Angel & Co., Inc., Bird City, Hango, 350 rolls.
Journal of Commerce, Bird City, Hango, 144 rolls.
Parsons & Whittemore, Inc., Westphalia, Hamburg, 455 rolls.

### PRINTING PAPER

Tamm & Co., Ryndam, Rotterdam, 5 cs.
W. Bersch, Ryndam, Rotterdam, 25 cs.
Dingelstedt & Co., Ryndam, Rotterdam, 11 cs.
E. Dietzgen & Co., Ryndam, Rotterdam, 6 cs.
A. Price & Son, Ryndam, Rotterdam, 43 cs.
Japan Paper Co., Ryndam, Rotterdam, 8 cs.
Perkins Goodwin & Co., Westphalia, Hamburg, 527 rolls.
F. Henjes, Jr., Westphalia, Hamburg, 68 rolls.
Keuffel & Esser Co., Westphalia, Hamburg, 21 rolls.
P. C. Zuhlke, Pennland, Antwerp, 51 cs.

### WRAPPING PAPER

Steffens Jones Co., Tomalva, Antwerp, 9 cs.
Standard Products Corp., Tomalva, Antwerp, 26 cs., 10 rolls.
Bendix Paper Co., Westphalia, Hamburg, 5 cs.
F. C. Strype, Pennland, Antwerp, 25 cs., 10 rolls.
National City Bank, Pennland, Antwerp, 48 cs.

### PACKING PAPER

National City Bank, Ryndam, Rotterdam, 20 bls.
S. Gilbert, Columbus, Bremen, 8 cs.
International Forwarding Co., Westphalia, Hamburg, 9 cs.

### TISSUE PAPER

F. B. Vandegrift & Co., Caronia, Liverpool, 13 cs.
F. C. Strype, Caronia, Liverpool, 1 cs.
G. W. Sheldon & Co., American Trader, London, 1 cs.
Hensel, Bruckman & Lorbacher, Westphalia, Hamburg, 3 cs.

### TRACING PAPER

Keuffel & Esser Co., Westphalia, Hamburg, 1 cs., 5 rolls.

### BARYTA COATED PAPER

J. H. Schroeder Banking Corp., Karlsruhe, Bremen, 50 cs.
Globe Shipping Co., Karlsruhe, Bremen, 46 cs.

### SURFACE COATED PAPER

Gevaert Co. of America, Ryndam, Rotterdam, 91 cs.
Gevaert Co. of America, Pennland, Antwerp, 34 cs.
P. C. Zuhlke, Pennland, Antwerp, 34 cs.
Phoenix Shipping Co., Westphalia, Hamburg, 2 cs.

### GOLD COATED PAPER

F. Murray Hill, Columbus, Bremen, 6 cs.

### METAL PAPER

Hensel, Bruckman & Lorbacher, Columbus, Bremen, 30 cs.

### COATED PAPER

Globe Shipping Co., Westphalia, Hamburg, 15 cs.

### DECALCOMANIA PAPER

C. W. Sellers, Columbus, Bremen, 8 cs.
L. A. Consmiller, Columbus, Bremen, 13 cs.

### PARCHMENT PAPER

Walker, Goulard, Plehn Co., Westphalia, Hamburg, 4 bls.

### STENCIL PAPER AND INK

Arlac Dry Stencil Co., Westphalia, Hamburg, 78 cs.

### PERGAMYN PAPER

F. C. Strype, Westphalia, Hamburg, 20 cs.
Central Union Trust Co., Westphalia, Hamburg, 18 cs.

### LITHO PAPER

Bernhard Meiners, Tatsuno Maru, Hong Kong, 15 cs.
J. H. & G. B. Siebold, Inc., Tatsuno Maru, Hong Kong, 25 cs.
Martin & Bechtold, Inc., Tatsuno Maru, Hong Kong, 50 cs.
G. B. Ritchie & Co., Tatsuno Maru, Hong Kong, 5 cs.

### DRAWING PAPER

Keuffel & Esser Co., Ausonia, Southampton, 2 cs.
Keuffel & Esser Co., Westphalia, Hamburg, 41 cs.
H. Reeve Angel & Co., Inc., Minnekahda, London, 2 cs.

### FILTER PAPER

Taiyo Trading Co., Tatsuno Maru, Nagoya, 1 cs.
H. Reeve Angel & Co., Inc., Minnekahda, London, 14 cs.
American Express Co., Minnekahda, London, 1 cs.
J. Manheimer, Homeric, Southampton, 165 bls.
H. Reeve Angel & Co., Inc., Homeric, Southampton, 30 bls.

### ENVELOPES

J. Beckhard & Co., Karlsruhe, Bremen, 21 cs.

### LETTER PAPER

Kadri Bros., France, Havre, 8 cs.

### COLORED PAPER

Borden Riley Paper Co., Pennland, Antwerp, 9 cs.

### ALUMINUM PAPER

Standard Products Corp., De Grasse, Havre, 8 cs.

### GLAZED PAPER

Richardson Bros., Albertic, Liverpool, 4 cs.

### STRAW BOARD

A. Vuyk, Ryndam, Rotterdam, 529 rolls.

### MISCELLANEOUS PAPER

Whitfield Paper Works, Tatsuno Maru, Kobe, 40 cs.
Steiner Paper Corp., Ryndam, Rotterdam, 24 cs.
International Forwarding Co., Ryndam, Rotterdam, 14 cs.
P. H. Petry & Co., Ryndam, Rotterdam, 12 cs.
Globe Shipping Co., Ryndam, Rotterdam, 1 cs.
H. D. Catty & Co., Ryndam, Rotterdam, 1 cs.
E. H. Sergeant & Co., Gripsholm, Gothenburg, 4 cs.
R. F. Downing & Co., France, Havre, 12 cs.
Tice & Lynch, France, Havre, 10 cs.
Japan Paper Co., France, Havre, 3 cs.
Standard Products Corp., France, Havre, 40 cs.
Guibout freres, France, Havre, 2 cs.
Hensel, Bruckman & Lorbacher, France, Havre, 12 cs.
Keller Dorian Paper Co., France, Havre, 10 cs.

### RAGS, BAGGINGS, ETC.

D. M. Hicks, Inc., West Eldara, Antwerp, 110 bls. flax waste.
Castle & Overton, Inc., West Eldara, Antwerp, 380 bls. bagging.
Salomon Bros. & Co., West Eldara, Antwerp, 95 bls. flax waste.
American Over-Ocean Corp., Tatsuno Maru, Kobe, 20 bls. rags.
Banco Com'l Italiane Trust Co., Isarco, Leghorn, 46 bls. bagging.
Bankers Trust Co., Karlsruhe, Bremen, 27 bls. rags.
A. W. Fenton, Inc., Sarcoxie, Dunkirk, 64 bls. rags.
Overton & Co., Ryndam, Rotterdam, 115 bls. bagging.
W. Steck & Co., Ryndam, Rotterdam, 33 bls. cotton waste.
Darmstadt, Scott & Courtney, Ryndam, Rotterdam, 39 bls. bagging.
A. Bloch & Co., Tomalva, Antwerp, 109 bls. flax waste.
B. D. Kaplan, Caronia, Liverpool, 7 bls. rags.
Banco Com'l Italiane Trust Co., Winona, Leghorn, 105 bls. rags.
B. D. Kaplan, American Trader, London, 61 bls. rags.
L. Leibowitz & Co., Gripsholm, Gothenburg, 11 bls. rags.
Equitable Trust Co., Athenia, Glasgow, 19 bls. paper stock.
A. H. Searle, Inc., Athenia, Glasgow, 119 bls. paper stock.
Brown Bros. & Co., Athenia, Glasgow, 185 bls. waste.
Darmstadt, Scott & Courtney, England Maru, Genoa, 45 bls. bagging.
E. J. Keller Co., Inc., England Maru, Oran, 250 bls. rags.
E. J. Keller Co., Inc., Marengo, Hull, 84 bls. rags.
G. W. Millar & Co., Inc., Marengo, Hull, 176 bls. rags.
S. Birkenstein & Sons, Marengo, Hull, 118 bls. rags, 112 bls. bagging.
Castle & Overton, Inc., Marengo, Hull, 95 bls. rags.
Castle & Overton, Inc., Marengo, Antwerp, 198 bls. flax waste.
E. Vernesse, Marengo, Antwerp, 272 bls. bagging.
E. J. Keller Co., Inc., Marengo, Antwerp, 49 bls. rags.
E. J. Keller Co., Inc., Marengo, Antwerp, 53 bls. thread waste.
E. J. Keller Co., Inc., Tiradentes, Antwerp, 398 bls. flax waste.
E. J. Keller Co., Inc., Tiradentes, Antwerp, 62 bls. jute cuttings.
S. Birkenstein & Sons, Cabo Espartel, Valencia, 244 bls. rags.

### OLD ROPE

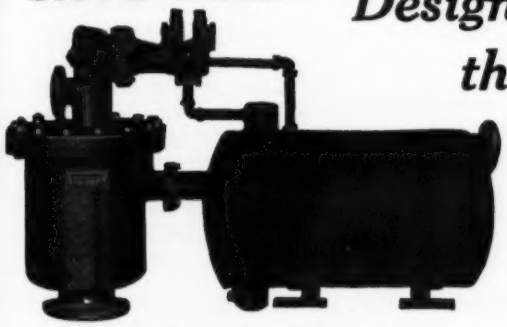
Brown Bros. & Co., Ryndam, Rotterdam, 42 coils.
G. W. Millar & Co., Inc., Ausonia, Southampton, 74 coils.
Brown Bros. & Co., Bergensfjord, Oslo, 52 bls.
Brown Bros. & Co., Montevideo, Coruna, 48 bls.
G. W. Millar & Co., Inc., Marengo, Hull, 74 coils.
N. Y. Trust Co., Cabo Espartel, Barcelona, 50 coils.

### CASEIN

Tradesman's National Bank, Phidias, Buenos Aires, 584 bags.
W. Recamera & Co., Pan America, Buenos Aires, 84 bags.
American Exchange Irving Trust Co., Pan America, Buenos Aires, 84 bags.
Kalbfleisch Corp., Pan America, Buenos Aires, 58 bags.
National City Bank, Pan America, Buenos Aires, 250 bags.

(*Continued on page 82*)

SAVE FUEL



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## *Designed to Eliminate the Defects of*

## PISTON AND CENTRIFUGAL PUMPS

1. Pistons, rotary parts, packings, and oils have been eliminated. Working parts are reduced to two valves.
2. No matter how high the temperature of the condensate, the Farnsworth Pump will handle it easily.
3. Steam consumption has been reduced to one quarter that of any centrifugal or piston type pump.

The Farnsworth Drainage Receiver and Pump is Fully Guaranteed to save its cost in one year or less.

It will pay you to investigate thoroughly the advantages of using Direct Pressure Pumping.

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**Heat Reclamation Engineers**
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**ONE great organization—a specialist in paper mill engineering and construction—designs, builds, rebuilds, reports, appraises, for many of the most important concerns in the paper industry. Plans, price, construction work, delivery date, owner's satisfaction, all guaranteed.**

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Mead Pulp and Paper Co. — Oswego Falls Corp.
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ENGINEERS

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# ALPHA

is the demonstrated result of this Company's forty years of research in pulp making.

¶ It now ranks among the preferred materials for the making of higher grade papers.

¶ It yields the papermaker a profit and gives his patrons more than their money's worth.

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*founded 1852*
PORTLAND MAINE

NEW YORK CHICAGO ST. LOUIS MINNEAPOLIS
BOSTON PITTSBURGH ATLANTA SAN FRANCISCO

# Imports of Paper and Paper Stock

(*Continued from page 80*)

CHINA CLAY

English China Clays Sales Corp., Wearbridge, Fowey, 50 cks., 25 tons.
English China Clays Sales Corp., Wearbridge, Fowey, 502 tons, 4 cwt. in bulk.
Moore & Munger, Wearbridge, Fowey, 563 tons, 8 cwt. in bulk.

WOOD PULP

Perkins Goodwin & Co., Bergensfjord, Drammen, 125 bls. sulphite.
Atterbury Bros., Inc., Bergensfjord, Drammen, 500 bls. wood pulp.
Bulkley, Dunton & Co., Panaman, ——, 1,502 bls. wood pulp.
Castle & Overton, Inc., A. Ballin, Hamburg, 734 bls. wood pulp.

WOOD PULP BOARDS

Lagerloef Trading Co., Bird City, Hango, 266 rolls, 50 tons.

WOOD PULP WADDING

Bendix Paper Co., Ryndam, Rotterdam, 50 bls.

## PHILADELPHIA IMPORTS

WEEK ENDING APRIL 14, 1928

Castle & Overton, Inc., West Eldara, Antwerp, 724 bls. rags.
Equitable Trust Co., West Eldara, Antwerp, 63 bls. rags.
Fidelity Trust Co., West Eldara, Antwerp, 114 bls. rags.
J. A. Steer & Co., West Eldara, Antwerp, 67 bls. old rope.
Phila. Girard National Bank, Balir, Algiers, 149 bls. rags.
Chase National Bank, Balir, Algiers, 76 bls. old rope.
A. Hurst & Co., Sarcoxie, Havre, 31 bls. rags.
W. Steck & Co., Sarcoxie, Havre, 134 bls. jute waste.
J. M. Hagy Waste Works, Sarcoxie, Havre, 45 bls. rags.
Salomon Bros. & Co., Sarcoxie, Havre, 262 bls. rags.
E. Butterworth & Co., Inc., Sarcoxie, Dunkirk, 129 bls. rags.
Castle & Overton, Inc., Sarcoxie, Dunkirk, 107 bls. rags.
J. M. Hagy Waste Works, Sarcoxie, Dunkirk, 70 bls. rags.
E. J. Keller Co., Inc., Sarcoxie, Dunkirk, 398 bls. rags.
V. Galaup, Winona, Leghorn, 51 bls. rags.
P. Berlowitz, Collamer, St. Nazaire, 127 bls. rags.
Castle & Overton, Inc., Collamer, St. Nazaire, 290 bls. rags.
E. J. Keller Co., Inc., Collamer, St. Nazaire, 95 bls. rags.
E. J. Keller Co., Inc., Collamer, Bordeaux, 108 bls. rags.
Robert Blank, Collamer, Bordeaux, 639 bls. rags.
Castle & Overton, Inc., Collamer, Bordeaux, 354 bls. rags.
Fidelity Trust Co., Collamer, Bordeaux, 359 bls. rags.
A. Hurst & Co., Collamer, Bordeaux, 20 bls. rags.
S. Birkenstein & Sons, Cabo Espartel, Valencia, 68 bls. rags.
E. J. Keller Co., Inc., Cabo Espartel, Valencia, 254 bls. rags.
Castle & Overton, Inc., Cabo Espartel, Valencia, 205 bls. rags.
Castle & Overton, Inc., Port Curtis, London, 145 bls. rags.
Castle & Overton, Inc., Manchester Hero, England, 201 bls. rags.
Castle & Overton, Inc., Ontario, France, 553 bls. rags.
Castle & Overton, Inc., Ala, Antwerp, 393 bls. rags.
Castle & Overton, Inc., Havre Maru, Japan, 305 bls. rags.
Castle & Overton, Inc., Turpin, Germany, 53 bls. rags.

## BOSTON IMPORTS

WEEK ENDING APRIL 14, 1928

English China Clays Sales Corp., Wearbridge, Fowey, 2,546 tons, 10 cwt. china clay in bulk.
English China Clays Sales Corp., Wearbridge, Fowey, 770 casks china clay, 385 tons.
Moore & Munger, Wearbridge, Fowey, 623 tons china clay in bulk.
Crocker Burbank Co., Port Curtis, London, 158 bls. waste paper.
Furniss Withy & Co., Port Curtis, London, 73 bls. rags.
Brown Bros. & Co., Port Curtis, London, 104 bls. waste paper.
T. D. Downing & Co., Port Curtis, London, 47 bls. rags.
M. Yoffe & Sons, Port Curtis, London, 8 bls. rags.
Bulkley, Dunton & Co., Beemsterdyk, ——, 500 bls. wood pulp.
Bulkley, Dunton & Co., Ivar, ——, 400 bls. wood pulp.

## BALTIMORE IMPORTS

WEEK ENDING APRIL 14, 1928

Congoleum Nairn Co., Tomalva, Antwerp, 2,533 bls. rags.
Congoleum Nairn Co., City of Alton, Rotterdam, 199 bls. bagging.
Banco Com'l Italiane Trust Co., Winona, Genoa, 288 bls. rags.
Lagerloef Trading Co., Bird City, Hango, 302 bls. wood pulp boards, 43 tons.
Lagerloef Trading Co., Bird City, Hango, 2,574 bls. wood pulp, 429 tons.
M. Gottesman & Co., Inc., Bird City, Hango, 2,310 bls. wood pulp, 380 tons.
R. J. Reynolds Tobacco Co., Collamer, St. Nazaire, 1,595 cs. cigarette paper.
Baltimore Trust Co., Collamer, Bordeaux, 77 bls. rags.
E. J. Keller Co., Inc., Beemsterdyk, Karlsruhe, 300 bls. wood pulp.

## NORFOLK IMPORTS

WEEK ENDING APRIL 14, 1928

N. Y. Trust Co., Tomalva, Antwerp, 30 bls. bagging.
Champion Coated Paper Co., Phidias, Buenos Aires, 1,425 bags casein.
E. J. Keller Co., Inc., Manchester Corp., Manchester, 68 bls. bagging.
E. J. Keller Co., Inc., Beemsterdyk, Rotterdam, 42 bls. rags.

## NEWPORT NEWS IMPORTS

WEEK ENDING APRIL 14, 1928

British American Tobacco Co., Tomalva, Antwerp, 43 rolls cigarette wrappers.

### To Confer on Wax Paper Trade Practice

WASHINGTON, D. C., April 18, 1928.—It is understood that the Federal Trade Commission has authorized a trade practice submittal for the wax paper manufacturers, although no place or date for such conference has been set.

Paul S. Hanway, secretary of the Wax Paper Manufacturers Association has been in Washington a number of times recently conferring with officials of the Commission. While details are not known it is said that there are a number of practices among the wax paper manufacturers that they are anxious to do away with and therefore the suggestion for the conference. It is understood that the Division of Trade Practice Conferences of the Federal Trade Commission have looked into the matter and that Division suggested to the Commission that such a conference be held. It is expected that the date for the conference will be set within the next few weeks.

### Report Favorably on McSweeney-McNary Bills

WASHINGTON, D. C., April 18, 1928.—Favorable reports have been made by the Agricultural Committee of both the Senate and the House on the so-called McSweeney- McNarry bills which provide adequate supplies of timber and promote the full use of timber growing in the United States and "for other purposes." This is the bill in which the paper trade showed so much interest a few weeks ago when prominent members of the trade appeared before Congressional committees in support of the bill. The bill is now on the calendar of both the Senate and House for action with indications that they will be passed at the present session.

### Export Inso Board to Holland

ST. JOSEPH, Mo., April 16, 1928.—Inso Board, the new insulating lumber manufactured from wheat straw by the Stewart Inso Board Company of St. Joseph, has already been exported, the first car leaving the plant last week consigned to lumber dealers in Holland.

After extensive tests, the Holland concerns selected Inso Board to sell to their trade and to use in their own building operations.

"We are very much pleased with the international reception we have received so far," says A. D. Stewart, president, "and the shipment to Holland is only one of many we expect to make in the very near future."

### Join National Safety Council

The following concerns have joined the Paper and Pulp Section of the National Safety Council since October 1, 1927:—Angier Corporation, Anglo-Canadian Pulp and Paper Mills Ltd., Brown Paper Mills Co., Inc., Dexter Sulphite Company (Reinstated), Haddon Press Inc., Hinde & Dauch Paper Company, Flintkote Company, Irving Pitt Manufacturing Company, New Orleans Corrugated Box Company, News-Sun Printing and Publishing Company, Paraffine Companies, Inc., Standard Paper Manufacturing Company, Tennessee Paper Mills, Texas Corrugated Box Company and Whitney-Graham Company.

### Award for Government Paper

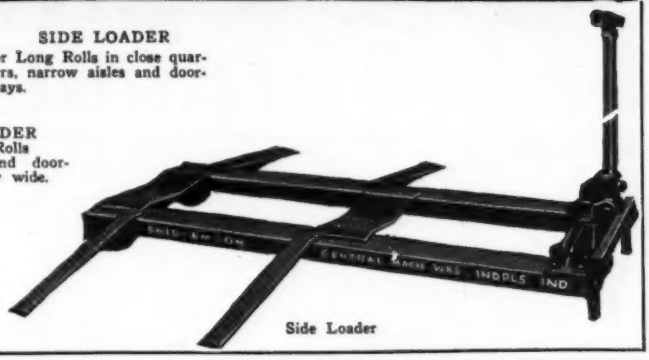
WASHINGTON, D. C., April 18, 1928.—The Crepe-Kraft Company has been awarded the contract for furnishing the Brooklyn Navy Yard with 70,000 sheets of 36 x 51 waterproof kraft paper at $1,995.00, bids for which were received on April 3.

## Handle them right ~~~ with SKID-EM-ON Trucks

SKID-EM-ON trucks are especially made for handling paper rolls. Handles them in less time, with less effort and without danger to paper stock. Try one at our expense for 30 days. Write stating the diameter, length and weight of the largest rolls you wish to handle. Also if you prefer End Loader or Side Loader.

SIDE LOADER
for Long Rolls in close quarters, narrow aisles and doorways.

END LOADER
for Short Rolls where aisles and doorways are amply wide.



Side Loader

**Central Machine Works**
*437 South Senate Ave., Indianapolis, Ind.*

**Show you're on the job—keep your cups filled with Albany**

Prevent your expensive machinery from going to the junk pile. Use the best lubricant money can buy. Albany Grease has stood the test for 60 years—a thorough lubricant, 100% pure tallow compound. Never drips.

If you want an extra fine mineral oil lubricant, use Albany Pressuregrease — soft, medium, hard, also graphite and transmission.

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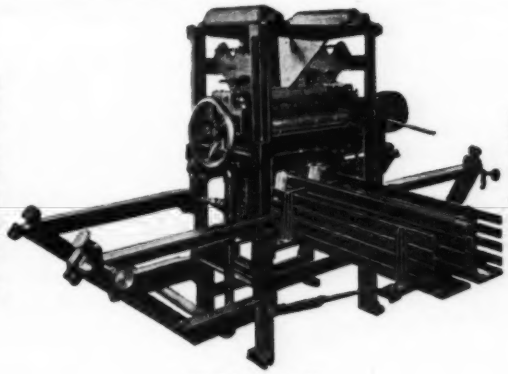
*Always look for the Albany Grease Trade Mark —Refuse Substitutes.*

Your dealer can supply you. If not, write us.
ADAM COOK'S SONS, Inc., 6 Varick St., N. Y.

**ALBANY GREASE**

DEPENDABLE



DURABLE

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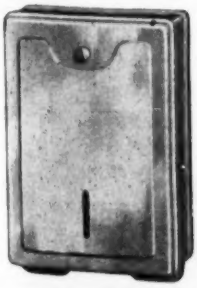
**NAPKIN FOLDING MACHINES**

**GUARANTEED PRODUCTION**

TOWEL FOLDERS | PRINTING DEVICES | BUNDLING PRESSES

**PAPER CONVERTING MACHINE CO.**
GREEN BAY, WIS.



**GRIFFITH-HOPE**

**Dispensing Cabinets AND Fixtures ARE**

**The STANDARD of the PAPER TRADE**
**For Towels, Toilet, Napkins, Etc.**

**GRIFFITH-HOPE CO., West Allis, Wisc.**

## New York Market Review

Office of THE PAPER TRADE JOURNAL,
Wednesday, April 18, 1928.

Demand for the various grades of paper is being well maintained and the local market is exhibiting a strong undertone. Sales organizations of the leading paper houses are booking an excellent volume of business and are generally optimistic over the outlook for the future. Quotations remain steady and unchanged and shading is infrequent.

The news print market continues active and the heavy production is being freely absorbed by the publishers. Stocks in hand are not excessive. According to the News Print Service Bureau stocks of news print in hand at the end of March at Canadian and United States mills totalled 82,295 tons, which was equivalent to 5.6 days' average production.

Little change has transpired in the paper board market. Prices continue steady and there is not much talk of concessions around. Conditions in the fine paper market are fairly satisfactory and prices are holding up very well. The coarse paper market is also in a strong position and wrapping paper is moving in a normal manner.

### Mechanical Pulp

Some improvement was noticed in the demand for ground wood. Most of the business being booked at the present time, however, is along routine lines. Production of late has been heavy enough to take care of immediate requirements. Prices are practically unaltered and recently quoted levels are being maintained without difficulty.

### Chemical Pulp

Steadiness prevails in the chemical pulp market and trading is fairly active for the time of the year. Although the lockout in the Swedish mills has practically ended, a cable to the Department of Commerce from Commercial Attache T. O. Klath at Stockholm, states that there is still some danger that the terms may prove unacceptable to workers in some plants. In addition to the heavy reduction in output, wage losses to workers in the pulp, paper and saw mill industries is estimated to have already reached approximately $8,000,000.

### Old Rope and Bagging

Both domestic and imported old rope were in moderate request during the past week. Foreign manila rope continues in particularly good demand. Quotations are generally unchanged. The bagging market is fairly active at present. In most instances, previously recorded levels are being maintained.

### Rags

Interest in the rag market was more noticeable than of late and inquiries from the paper mills were more numerous. Demand for new domestic rags, in particular, showed signs of improvement and supplies are beginning to move into consumption in somewhat heavier volume. No radical changes were recorded in the quotations on either domestic or imported rags.

### Waste Paper

The paper stock market was fairly active during the past week. Book stock is still in excellent request and with offerings decidedly scarce, prices rule steady to firm. Mill interest is also developing for various other grades and the future outlook for the market is promising. Quotations are generally holding up to schedule.

### Twine

Conditions in the twine market continue fairly satisfactory. The demand for the various grades is persistent, mainly influenced by the continued heavy movement of wrapping paper. Inquiries for future business are being received in fair volume. Prices are being maintained at the levels which have ruled for some time.

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### Westvaco Inspirations for Printers

Published by the West Virginia Pulp and Paper Company, Westvaco Inspirations for Printers is an unusually handsome volume, beautifully illustrated in colors by innumerable artists of repute.

The pages are printed on the various Westvaco mill brand papers. Engraving processes, both in black and white, and in colors, are comprehensively demonstrated. Cover designs, type faces used and foreign numbers are attractively displayed.

Congratulations are due to the West Virginia Pulp and Paper Company for their enterprise in putting out and distributing such an artistic and invaluable work which will undoubtedly be treasured by all fortunate enough to receive a copy.

---

### West End Paper Mill Staff Changes

CARTHAGE, N. Y., April 16, 1928.—John Breagle, superintendent of the West End Paper Mill, has resigned his connection with the firm, his resignation becoming effective this week. He has been in charge of the West End plant for about a year, coming here early in 1927. Mr. Breagle has not yet decided upon his future plans, but is said to have several offers under consideration. He and Mrs. Breagle are now visiting in Niagara Falls.

Clarence Gilmore has been appointed superintendent of the West End mill to succeed Mr. Breagle. The new executive assumed his duties this week. He is an experienced paper mill man and comes from Potsdam, where he was connected with the mill of the Racquette River Paper Company.

---

### Goes With Portland Paper Box Co.

PORTLAND, Ore., April 12, 1928.—Payson Thompson, for several years sales manager of the Columbia Paper Box Company, Portland, has accepted a position in the same capacity for the Portland Paper Box Company. Mr. Thompson is favorably known to the trade and is actively interested in civic affairs and the promotion of the industrial northwest.

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### J. G. Bullard Joins Dennison Staff

J. Gordon Bullard, formerly chemist of the Warren Manufacturing Company mill at Milford, N. J., and a member of TAPPI, is now with the Dennison Manufacturing Company, of Framingham, Mass.

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### W. A. Wylde With Kaydeross Paper Co.

W. A. Wylde, formerly manager of the Liberty Paper Company, of Bellows Falls, Vt., is now general superintendent of the Kaydeross Paper Company, of Rock City Falls, N. Y., and became a member of TAPPI.

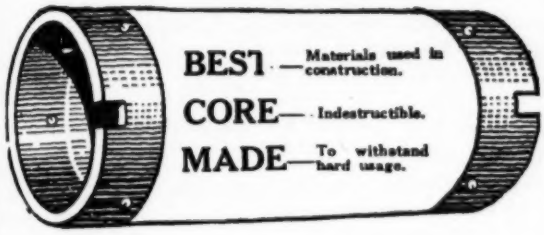
## SHIPPING INSURANCE

The Use of

# ELIXMAN CORES

protects your rolls and insures their delivery to your customer in perfect condition. They eliminate claims for damages.

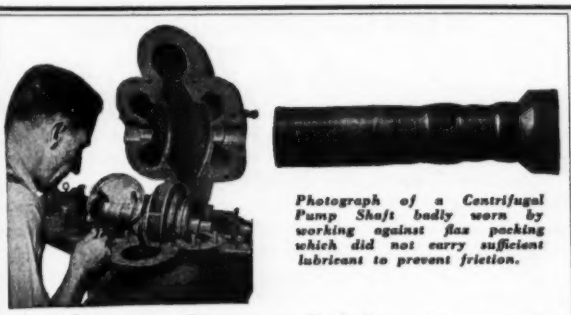
## SHIPPING INSURANCE




*Your two sources of supply are*

**Canadian Elixman Company**
HAMILTON, ONTARIO

**Elixman Paper Core Company**
CORINTH, N. Y.



*Photograph of a Centrifugal Pump Shaft badly worn by working against flax packing which did not carry sufficient lubricant to prevent friction.*

**Avoid scoring the pump shaft by using a packing that has sufficient lubricant to prevent friction.**

## STYLE C PACKING

**For pumps handling caustic soda and similar chemicals.**

**Its lubricant can be relied upon to resist the cutting action of these chemicals, and to keep the pump shaft so perfectly lubricated as to avoid friction.**

**To prove our claims let us send you a free working sample to test under your own conditions.**

***Specify Style C and state size desired.***

*GREENE, TWEED & CO.*
*Sole Manufacturers*
109 Duane St., New York

"Ask Your Neighbor What He Thinks of Them"

## 109 JENSSEN

**Two-Tower Acid Systems now in operation or building.**

**Jenssen Spray Type Cooler**
**Bullard Gas Washer**
**Decker Cooking Process**
**Kamyr Feltless Machines**
**Kamyr Pulp Presses**
**Strindlund Relief Cooler**

**G. D. Jenssen Company**
200 5th Ave. New York, N. Y.

## FIDALGO DRYING SYSTEMS

(Patented)

PULP CHIPS BARK

FEATURES—Largest factory production and greatest experience in field.

WE FURNISH complete system for bleached or unbleached stock, insuring lowest operating cost, minimum floor space, cleanliness, high test and simple baling method for domestic and export shipments.

LATEST INSTALLATIONS—Union Bag and Paper Power Corporation, Tacoma, Washington, Shaffer Box Company, Tacoma, Washington.

**Technical Economist Corporation**
40 RECTOR STREET, NEW YORK, N. Y.
Telephone Whitehall 5243 Cable Herenco

# TANKS

**Blow Pits**
**Acid Storage Tanks, Vats, Etc.**

Send us your specifications for prompt shipment.

**Kalamazoo Tank & Silo Co.**
Kalamazoo, Michigan

# Miscellaneous Markets

Office of THE PAPER TRADE JOURNAL,
Wednesday, April 18, 1928.

Seasonal conditions prevail in the local chemical market. Demand for the various chemicals used in the paper mills is well sustained and the volume of inquiries being received for future business is well up to average. Shipments against contract are going forward at a steady pace and the movement into consumption is expected to continue along active lines for some time. Prices are holding up to schedule, in most instances.

BLANC FIXE.—Most of the business transacted in the blanc fixe market was routine. Both the pulp and the powder were in moderate request during the week. Prices remain unchanged. The pulp is still selling at $60 per ton, in bulk, while the powder is quoted at from 4 cents to 4½ cents a pound, in barrels, at works.

BLEACHING POWDER.—The bleaching powder market is in a sound position. Demand for this product at the present time is moderately active and prices are holding up to formerly quoted levels. Bleaching powder is still offered at from $2 to $2.35 per 100 pounds, in large drums, at works, according to quantity and grade.

CASEIN.—Demand for casein was fairly satisfactory during the week. Contract withdrawals continue to proceed in a regular manner. Prices remain unaltered. Domestic casein is quoted at from 16 to 16½ cents a pound, in bags, car lot quantities, while imported casein is also selling at around the same quotation.

CAUSTIC SODA.—Supplies of caustic soda continue to move into consumption in heavy volume. Shipments for the first quarter of the year were well above the average for the corresponding period last year. Caustic soda is selling at from $2.90 to $2.95 per 100 pounds. The flake and the ground are quoted at from $3.30 to $3.35 per 100 pounds, in large drums, at works.

CHINA CLAY.—Business in the china clay market was fairly active during the past week. Contract shipments are proceeding at a steady pace. Prices remain unaltered. Imported china clay is quoted at from $15 to $25 a ton, in bulk, ship side. Domestic paper makers' clay is selling at from $8 to $9 a ton, at mine, and pulverized at from $10 to $12 a ton.

CHLORINE.—Steadiness prevails in the chlorine market. The movement against contract is proceeding in a satisfactory manner. Prices remain unchanged. Chlorine is quoted at 3½ cents a pound, in tanks, or multi-unit cars, at works, on contract orders. The spot quotation ranges from 3¾ cents to 4 cents a pound.

ROSIN.—Slight fluctuations were recorded in the rosin market during the week. Demand was fairly active and supplies continue to move at a normal pace for the season. At the naval stores, the grades of gum rosin used in the paper mills are now offered at from $9.55 to $10.05 per 280 pounds, ex dock, in barrels. Wood rosin is quoted at from $7.25 to $8.05 per 280 pounds, southern shipping points.

SALT CAKE.—Offerings of salt cake are about sufficient to take care of current requirements. Manufacturers are well sold ahead and the undertone of the market is strong. Prices are steady and unchanged. Salt cake is quoted at from $18 to $20 a ton, in bulk, at works. Chrome salt cake is offered at from $14 to $15 a ton, in bulk, at works.

SODA ASH.—Conditions in the soda ash market are practically unchanged. Demand for this product is excellent and contract withdrawals are moving in a satisfactory manner. Prices are holding up to previously recorded levels. Contract quotations on soda ash, in car lots, at works, are as follows: in bags, $1.32½, and in barrels, $1.55.

STARCH.—The starch market continues to exhibit a firm tendency. Due to the continued high prices of raw material quotations on this product are at the highest point of the year. Supplies continue to move into consumption at an excellent pace. The quotation on special paper makers' starch is now $3.97 per 100 pounds, in bags, and $4.14 per 100 pounds, in barrels.

SULPHATE OF ALUMINA.—Trading in the sulphate of alumina market during the past week was along seasonal lines. Demand was normal for the time of the year and the contract movement continues fairly heavy. Prices remain unchanged. Commercial grades of sulphate of alumina are quoted at from $1.40 to $1.55 per 100 pounds. The iron free is selling at from $1.90 to $2.05 per 100 pounds, in bags, at works.

SULPHUR.—Contract withdrawals of sulphur continue to go forward in excellent volume for the time of the year. Demand for this material is fairly brisk and the tone of the market is strong. Prices are holding up to schedule, without difficulty. The grades of sulphur used in the paper mills are selling at from $18 to $19 a ton, in bulk, at mine, according to quantity. The spot quotation is $20 a ton.

TALC.—No radical changes were recorded in the talc market during the past week. Most of the business transacted was along routine lines. Prices are holding up to the levels which have prevailed for some considerable time. Domestic talc is quoted at from $16 to $18 a ton, at eastern mines. Imported talc is offered at from $18 to $22 a ton, ship side.

## Standard Paper Co. To Add Machine

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., April 16, 1928.—Directors of the Standard Paper Company have authorized the installation of a new machine and an increase in the boiler house capacity. At the annual meeting of this company, held in January, the capital stock was increased from $800,000 to $1,000,000, an advance of 25 per cent. This stock will now be offered to stockholders at par and will without doubt be immediately absorbed. For several years Standard paid eight per cent annually and about a year ago the dividend was increased to 12 per cent, payable three per cent quarterly.

According to B. C. Dickinson, president of the company the new machine will be of the highest type cylinder design, for the manufacture of board. It will have vertical dryers and will be the product of the Black-Clawson Company, Hamilton, Ohio. At the same time the most approved type of machine drives will be installed.

This machine, which will have a maximum capacity of 70 tons daily, will replace the first machine installed back in 1904. It was at that time the Standard Paper Company was organized and purchased the plant of the Kalamazoo Wheel Company. The original capital was $60,000 and the maximum output 20 tons daily. With the installation of the new machine it will be possible to turn out 150 tons of board daily. The addition of the new machine necessitates an increase in the boiler capacity and an additional boiler will be ordered.

Business has been very satisfactory during the past year according to President Dickinson.

## Big Demand for Cellophane

In a survey of the baking industry in the United States which has just been completed by the Du Pont Cellophane Company, it is pointed out that the advent of the new moistureproof cellophane is one of the most important recent developments in this trade. This material is being used successfully for layer cakes, small cakes and doughnuts, and, during the past Christmas season, the report states that the fruit cakes of many of the well-known bakers appeared in this wrap.

Another fact is that there are more than fifty items, exclusive of the popular cookie units, which have adopted some sort of packaging in which this material is featured. The survey deals in detail with both the manufacturing and retail problems of the trade and offers suggestions as well as illustrations showing the most profitable manner in which to adapt the wrap to the needs of the industry. The data for this report was compiled after consultation with the trade itself, editors of trade papers, executives of large concerns in different parts of the country as well as with food research experts.

For reliable running and average long life

# LINDSAY FOURDRINIER WIRES

are unsurpassed

We make them for the largest and fastest machines.

Cylinder Wires All Sizes

**The Lindsay Wire Weaving Co.**

Collinwood Sta. CLEVELAND, OHIO

PQ

## Things that tests show

The paper buyer knows a great deal about your paper just by looking at it. He learns some other things by testing it. Comparison of various sheets made with silicate of soda* with papers without silicate show him the difference. The silicated sheet shows a substantial increase in the ash test. The "Pop" test is usually higher, sometimes as much as 12%. And the resistance to printer's ink in every case is improved, and when used with rosin size, water resistance is even greater than when rosin is used alone.

It's wiser for you to do the testing first in your mill. Send for full particulars about a comparative trial run.

* "A-Syrup" or "S" Brand.

**Philadelphia Quartz Co.**

SILICATE HEADQUARTERS

PHILADELPHIA

*Prompt deliveries made from stocks in*

NEW YORK
BOSTON
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## Our hat has been in the ring—

for over half a century. We believe we know what constitutes good dyestuffs. Our customers think so too—for they stick to us. Any Heller & Merz dyestuff is a good dyestuff.

*And we make good on service also.*

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Boston 287 Atlantic Ave. | Chicago 146 W. Kinzie St. | Philadelphia 114 Market St.

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CLAY

OF ABSOLUTE UNIFORMITY

*American Made for American Trade*

**Two Leading American Clays**

**H. T. BRAND**

**For Coating and Filling**

Now used in many of largest paper mills

**KLONDYKE BRAND**

**Filler Clay**

43 years' experience in American washed clays are back of these products.

*Ask for Samples*

**The EDGAR BROS. CO.**

50 Church Street New York

# Market Quotations

Quoted by Hepburn & Co., 74 Broadway, N. Y. City, to whom all inquiry for quotations on these or any other Securities is referred.

| BONDS | BID | OFFERED |
|---|---|---|
| A. P. W. Pulp & Power, 7s 1945 | 101½ | 103 |
| American Writing Paper, 6s 1947 | 80 | 82 |
| Bastrap Pulp & Paper, 6½s 1940 | 100 | 103 |
| British Columbia Pulp & Paper, 6s 1950 | 86 | 92 |
| Beaver Products Corp., 7½s 1942 | 106 | 109 |
| Bedford Pulp & Paper, 6½s 1942 | 98½ | None |
| Brown Paper Co., 1st 5½s 1946 | 96½ | 99 |
| Bryant Paper Co., 6s 1942 | 100½ | 102 |
| Cape Breton Pulp & Paper, 6s 1932 | 101 | 103 |
| Central Paper, 7s 1933 | 85 | None |
| Central Paper Serial 6, 6½s 1942 | 89 | ... |
| Champion Coated Paper, 6s 1926 to 1932 | 99 | ... |
| Champion Fibre, 8s 1930 | 100 | ... |
| Champion Paper Corp'n, 1st 6s 1945 | 95 | 97 |
| Continental Paper Products, 6½s 1943 | 88 | 91½ |
| Cornell Wood Prod., 7½s 1937 | 100 | 104* |
| Crown Willamette Paper, 6s 1951 | 100 | 102 |
| Donnaconna Paper, 6s 1940 | 101 | 102½ |
| Della Paper & Pulp Serial, 6s 1926-38 | *95 | ... |
| Eastern Mfg. Co., 7s 1938 | 89 | 91 |
| Eddy Paper, 7½s 1931 | 101 | 103 |
| Escanaba Paper Serial, 6s 1928 | 99¾ | ... |
| Filer Fibre Serial, 7s 1926-39 | 95 | ... |
| Fort Orange Paper, 7s 1942 | 99 | 102 |
| Fox River Paper, 7s 1931 | 99 | ... |
| Gair Company, 5½s 1942 | 96 | 99 |
| Gilbert Paper Co., 6½s 1926-29 | 91 | None |
| Hammermill Paper, 6s 1939 | 100 | 103* |
| Hoberg Paper & Fibre, 7s 1937 | 94½ | 96 |
| Itaska Paper & Prairie River Power, J+5½s 1926-38 | 99 | 101 |
| Itaska Paper, 1st 6s 1933-38 | 99 | 101 |
| Kalamazoo Veg. Parchment, 6s 1938 | 98 | ... |
| Marinette & Menominee, 7½s 1936 | 100 | 103 |
| Menasha Printing & Carton, 6½s 1939 | 99½ | ... |
| Monroe Paper Products, 7½s 1932 | 96 | ... |
| Munising Paper, 6s 1927-36 | 96 | 100 |
| Nekoosa Edwards, 1st Ref. 6s 1928 to 1942 | 96 | 99* |
| Orono Pulp & Paper, 6s 1943 | 98 | ... |
| Orono Pulp & Paper, 5s 1941 | 95 | ... |
| Oswego Falls Corp., 6s 1941 | 98 | 100* |
| Oxford Paper, 6s 1947 | 104 | ... |
| Paepcke Paper Mills, 7s 1930 | 99 | None |
| Parsons Pulp & Lumber, 7s 1928 | 97 | ... |
| Parker Young Co., 6½s 1944 | 96½ | 98½ |
| Paterson Parchment Paper, 6s 1938 | 100½ | 102 |
| Penobscot Chemical Fibre, 6s 1942 | 98 | ... |
| Queens City Paper, 7s 1932 | 95 | 100* |
| Richardson Co., 6s 1938 | 100 | ... |
| River Raisin Paper, 6s 1936 | 96 | ... |
| Spanish River Pulp & Paper, 8s 1941 | 108 | 110 |
| Stevens & Thompson Paper, 6s 1942 | 93 | 95 |
| St. Anne Paper, 6½s 1946 | 99 | 101 |
| St. Croix Paper, 5s 1936-37 | 95 | 98* |
| St. Regis Paper Serial, 6½s 1926-35 | 99½ | 101 |
| Tait Paper & Color Industries, 6s 1934 | 91 | 95 |
| Taggart Bros. Co., 6s 1944 | 95 | 97 |
| Ticonderoga Pulp & Paper, 5s 1930 | 94 | 98 |
| Ticonderoga Pulp & Paper, 6s 1940 | 99 | 101 |
| Warren (The S. D.) Company, 6s 1945 | 99 | 101 |
| Wotab Paper, 6½s 1943 | 102 | ... |
| Westfield River Paper, 7s 1926-43 | 91 | ... |
| Whitaker Paper, 7s 1942 | 106 | 108 |

| STOCKS | BID | ASKED |
|---|---|---|
| American Box Board, Pfd. | 8 | 10 |
| American Box Board, Com. | 8 | 10 |
| Am. Tissue Mills, 7% Pfd. | 90 | 93 |
| British Columbia P. & P., Pfd. | 54 | 58 |
| Brompton Pulp & Paper, 8% Pfd. | 100 | 102 |
| Brown Corpn., 7% Pfd. | 100 | 104 |
| Champion Fibre, 7% Pfd. | 106 | 112 |
| Diem & Wing, 7% Cum. Pfd. | 90 | ... |
| Eastern Mfg. Co., 1st Pfd. | 28 | 33 |
| Great Northern Paper, Com. | 70 | 75 |
| Hammermill Paper, 7% Pfd. | 105 | 110 |
| Hinde & Dauch, Com. | 135 | ... |
| Hinde & Dauch, Pfd. | 100 | ... |
| Holyoke Card & Paper | 160 | None |
| Marathon Paper Mills, Com. | 125 | ... |
| Midwest Box Co., Pfd. 8% | 94 | 98 |
| Midwest Box Co., Pfd. 6% | 92 | 97 |
| Louis De Jonge Co., 7% Pfd. | 93 | 96 |
| Oxford Papers, Com. | 160 | 170 |
| Oxford Paper Co., Pfd. | 105 | 108 |
| Penobscot Chemical Fibre, Com. | 65 | 75* |
| Richardson, 7% Pfd. | 160 | ... |
| Rubberoid | 74 | 77 |
| Seaman Container, Class B (par $1) | 1 | None Off. |
| Seaman Paper Co. | Wanted | None Off. |
| St. Croix Paper | 150 | 170 |
| St. Regis Paper Co., 7% Cum. Pfd. | 101½ | 104½ |
| Westfield River Paper Co., 1st Pfd. | Wanted | None Off. |
| West Virginia Pulp and Paper Company | 50 | 55 |
| West Virginia Pulp & Paper, Pfd. | 101 | 103 |
| Whittaker Paper 7% Cum. Pfd. | 98 | 103 |

* Nominal.

## Paper

(F. o. b. Mill)

| | | |
|---|---|---|
| Ledgers | 11.00 | @38.00 |
| Bonds | 9.00 | @45.00 |
| Writings— | | |
| Extra Superfine | 14.00 | @32.00 |
| Superfine | 14.00 | @32.00 |
| Tub sized | 10.00 | @15.00 |
| Engine Sized | 8.00 | @11.00 |
| News— | | |
| Rolls, contract | 3.25 | @ — |
| Rolls, transient | 3.25 | @ 3.50 |
| Sheets | 3.65 | @ 3.85 |
| Side Runs | 3.00 | @ 3.75 |
| Book, Cased— | | |
| S. & S. C. | 6.35 | @ 7.75 |
| M. F. | 6.25 | @ 7.75 |
| Coated and Enamel | 8.00 | @15.00 |
| Lithograph | 8.00 | @15.00 |
| Tissues—Per Ream— | | |
| White No. 1 | .75 | @ 1.00 |
| Anti-Tarnish | 1.10 | @ 1.90 |
| Colored | 1.00 | @ 2.00 |
| White No. 2 | .75 | @ .85 |
| Kraft | .90 | @ 1.00 |
| Manila | .75 | @ .85 |
| Kraft— | | |
| No. 1 Domestic | 6.25 | @ 6.50 |
| No. 2 Domestic | 4.50 | @ 4.75 |
| Southern | 4.25 | @ 4.50 |
| Imported | 6.50 | @ 7.00 |
| Manila— | | |
| No. 1 Jute | 9.00 | @ 9.25 |
| No. 2 Jute | 7.75 | @ 8.50 |
| No. 1 Wood | 4.75 | @ 5.25 |
| No. 2 Wood | 4.00 | @ 4.50 |
| Butchers | 3.75 | @ 4.25 |
| Fibre Papers— | | |
| No. 1 Fibre | 5.00 | @ 5.50 |
| No. 2 Fibre | 4.75 | @ 5.25 |
| Common Bogus | 2.75 | @ 3.00 |
| Screenings | 3.00 | @ 3.25 |
| Card Middles | 4.00 | @ 5.00 |
| Glassine— | | |
| Bleached, basis 25 lbs. | 13.00 | @16.00 |
| Bleached, basis 20 lbs. | 15.00 | @16.00 |

(Delivered New York)

| Boards—per ton— | | |
|---|---|---|
| News | 45.00 | @47.50 |
| Straw | 57.50 | @60.00 |
| Chip | 42.50 | @45.00 |
| Binders' Boards | 70.00 | @75.00 |
| Sgl. Mla. Ll. Chip. | 55.00 | @60.00 |
| Wood Pulp | 80.00 | @85.00 |
| Container | 67.50 | @72.50 |

## Mechanical Pulp

(Ex-Dock)

| | | |
|---|---|---|
| No. 1 Imported— | | |
| Moist | 30.00 | @31.25 |
| Dry | 32.00 | @34.00 |

(F. o. b. Mill)

| | | |
|---|---|---|
| No. 1 Domestic | 26.00 | @29.00 |
| Screenings | 15.00 | @20.00 |

## Chemical Pulp

(Ex-Dock, Atlantic Ports)

| | | |
|---|---|---|
| Sulphite (Imported)— | | |
| Bleached | 3.55 | @ 4.25 |
| Easy Bleaching | 2.70 | @ 2.90 |
| No. 1 strong unbleached | 2.60 | @ 2.70 |
| Mitscherlich unbleached | 2.65 | @ 3.25 |
| No. 2 strong unbleached | 2.50 | @ 2.60 |
| No. 1 Kraft | 2.55 | @ 2.75 |
| No. 2 Kraft | 2.40 | @ 2.50 |
| Sulphate— | | |
| Bleached | 3.75 | @ 3.85 |

(F. o. b. Pulp Mill)

| | | |
|---|---|---|
| Sulphite (Domestic)— | | |
| Bleached | 3.40 | @ 4.75 |
| Easy Bleaching Sulphite | 2.60 | @ 2.75 |
| News Sulphite | 2.40 | @ 2.65 |
| Mitscherlich | 3.00 | @ 3.70 |
| Kraft (Domestic) | 2.60 | @ 3.30 |
| Soda Bleached | 3.25 | @ 3.50 |
| Sulphate Screenings— | | |
| Coarse | .75 | @ .85 |
| Refined | 1.50 | @ 1.65 |

## Domestic Rags

### New Rags

(Prices to Mill f. o. b. N. Y.)

| | | |
|---|---|---|
| Shirt Cuttings— | | |
| New White, No. 1 | 11.75 | @12.25 |
| New White, No. 2 | 8.00 | @ 8.50 |
| Silesias No. 1 | 7.25 | @ 7.75 |
| New Unbleached | 10.50 | @11.00 |
| Washables | 4.25 | @ 4.75 |
| Fancy | 5.50 | @ 6.00 |
| Blue Overall | 6.75 | @ 7.25 |
| New Blue Prints | 5.25 | @ 5.50 |
| New Soft Blacks | 5.25 | @ 5.75 |
| Mixed Khaki Cuttings | 4.75 | @ 5.25 |
| Pink Corset Cuttings | 8.00 | @ 8.50 |
| O. D. Khaki Cuttings | 5.25 | @ 5.75 |
| Men's Corduroy | 3.75 | @ 4.25 |
| New Mixed Blacks | 3.50 | @ 3.75 |

### Old Rags

| | | |
|---|---|---|
| White, No. 1— | | |
| Repacked | 5.50 | @ 6.00 |
| Miscellaneous | 4.50 | @ 5.00 |
| White, No. 2— | | |
| Repacked | 3.00 | @ 3.50 |
| Miscellaneous | 2.50 | @ 2.75 |
| St. Soiled, White | 2.00 | @ 2.15 |
| Thirds and Blues— | | |
| Repacked | 2.25 | @ 2.50 |
| Miscellaneous | 1.75 | @ 2.00 |
| Black Stockings | 3.25 | @ 3.75 |
| Roofing Rags— | | |
| Cloth Strippings | 1.70 | @ 1.80 |
| No. 1 | 1.70 | @ 1.80 |
| No. 2 | 1.50 | @ 1.60 |
| No. 3 | 1.30 | @ 1.40 |
| No. 4 | 1.25 | @ 1.35 |
| No. 5A | .95 | @ 1.05 |

## Foreign Rags

| | | |
|---|---|---|
| New Dark Cuttings | 2.75 | @ 3.25 |
| New Mixed Cuttings | 3.00 | @ 3.50 |
| Ord. Light Prints | 2.25 | @ 2.50 |
| New Light Silesias | 7.00 | @ 7.50 |
| Light Flannelettes | 7.50 | @ 8.00 |
| Unbleached Cottons | 10.00 | @11.00 |
| New White Cuttings | 10.50 | @11.50 |
| New Light Oxfords | 7.00 | @ 7.50 |
| New Light Prints | 5.50 | @ 6.50 |
| No. 1 White Linens | 7.25 | @ 8.00 |
| No. 2 White Linens | 5.50 | @ 6.25 |
| No. 3 White Linens | 4.50 | @ 5.00 |
| No. 4 White Linens | 3.00 | @ 3.50 |
| Old Extra Light Prints | 2.75 | @ 3.25 |
| Med. Light Prints | 1.90 | @ 2.10 |
| Dutch Blue Cottons | 2.25 | @ 2.50 |
| German Blue Linens | 2.50 | @ 2.75 |
| German Blue Cottons | 2.00 | @ 2.25 |
| Checks and Blues | 1.75 | @ 2.00 |
| Lindsay Garments | 1.85 | @ 1.95 |
| Dark Cottons | 1.50 | @ 1.60 |
| Shoppery | 1.45 | @ 1.55 |
| French Blues | 2.25 | @ 2.50 |

## Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

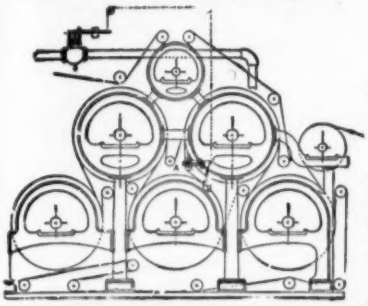
| | | |
|---|---|---|
| Gunny No. 1— | | |
| Foreign | 1.65 | @ 1.75 |
| Domestic | 1.70 | @ 1.75 |
| Wool Tares, light | 1.60 | @ 1.65 |
| Wool Tares, heavy | 1.60 | @ 1.65 |
| Bright Bagging | 1.60 | @ 1.65 |
| Small Mixed Rope | 1.25 | @ 1.40 |
| Manila Rope— | | |
| Foreign | 3.00 | @ 3.10 |
| Domestic | 3.25 | @ 4.00 |
| New Burlap Cut | 2.75 | @ 3.00 |
| Hessian Jute Threads— | | |
| Foreign | 3.50 | @ 4.00 |
| Domestic | 3.25 | @ 3.50 |

## Old Waste Papers

(F. o. b. New York)

| | | |
|---|---|---|
| Shavings— | | |
| Hard, White, No. 1 | 3.25 | @ 3.50 |
| Hard, White, No. 2 | 2.75 | @ 3.00 |
| Soft, White, No. 1 | 2.60 | @ 2.85 |
| Flat Stock— | | |
| Stitchless | 1.85 | @ 1.95 |
| Overissue Mag. | 1.90 | @ 2.00 |
| Solid Flat Book | 1.75 | @ 1.80 |
| Crumpled No. 1 | 1.25 | @ 1.35 |
| Solid Book Ledger | 2.00 | @ 2.10 |
| Ledger Stock | 1.80 | @ 1.90 |
| New B. B. Chips | .65 | @ .75 |
| Manilas— | | |
| New Env. Cut | 2.40 | @ 2.60 |
| New Cuttings | 1.60 | @ 1.85 |
| Extra No. 1 old | 1.25 | @ 1.35 |
| Print | .85 | @ .95 |
| Container | .70 | @ .80 |
| Bogus Wrapper | .75 | @ .85 |
| Old Kraft Machine Compressed bales | 1.95 | @ 2.05 |
| News— | | |
| No. 1 White News | 1.60 | @ 1.70 |
| Strictly Overissue | .80 | @ .90 |
| Strictly Folded | .65 | @ .70 |
| No. 1 Mixed Paper | .45 | @ .50 |
| Common paper | .30 | @ .35 |

The Pickles Drying Regulator



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*Successors to the Granger Foundry & Machine Co.*

**The Textile-Finishing Machinery Company**
**PROVIDENCE, R. I.**

### Twines

(F. o. b. Mill)

| | | | |
|---|---|---|---|
| Cotton— | | | |
| No. 1 | .39 | @ | .40 |
| No. 2 | .37 | @ | .38 |
| No. 3 | .36 | @ | .37 |
| B. C., 18 basis | .38 | @ | .40 |
| A. B. Italian, 18 basis | .48 | @ | .53 |
| Finished Jute— | | | |
| Dark 18 basis | .24 | @ | .25 |
| Light 18 basis | .27 | @ | .28 |
| Jute Wrapping, 3-6 Ply— | | | |
| No. 1 | .21 | @ | .23 |
| No. 2 | .20 | @ | .22 |
| Tube Rope— | | | |
| 4-ply and larger | .18 | @ | .19 |
| Fine Tube Yarn— | | | |
| 5-ply and larger | .23 | @ | .27 |
| 4-ply | .24 | @ | .28 |
| 3-ply | .26 | @ | .30 |
| Unfinished India— | | | |
| Basis | .16 | @ | .17 |
| Paper Makers Twine Balls | .13 | @ | .15 |
| Box Twine, 2-3 ply | .17 | @ | .19 |
| Jute Rope | .21 | @ | .23 |
| Ameri. Hemp, 6 | .29 | @ | .31 |
| Sisal Hay Rope— | | | |
| No. 1 Basis | .18 | @ | .20 |
| No. 2 Basis | .16 | @ | .18 |
| Sisal Lath Yarn— | | | |
| No. 1 | .16 | @ | .18 |
| No. 2 | .14 | @ | .16 |
| Manila Rope | .24 | @ | .26 |

## CHICAGO

| | | | |
|---|---|---|---|
| All Rag Bond | .35 | @ | .41 |
| No. 1 Rag Bond | .25 | @ | .35 |
| No. 2 Rag Bond | .14 | @ | .25 |
| Water Marked Sulphite Bond | .09 | @ | .12 |
| Sulphite Bond | .06¾ | @ | .11 |
| Superfine writing | .18 | @ | .24 |
| No. 1 fine writing | .14 | @ | .18 |
| No. 2 fine writing | .12 | @ | .14 |
| No. 3 fine writing | .08½ | @ | .12 |
| No. 1 M. F. Book | .06½ | @ | .07¼ |
| No. 2 M. F. Book | .05¼ | @ | .06¼ |
| No. 1 S.&S.C. Book | .06¾ | @ | .07¾ |
| No. 2 S.&S.C. Book | .05¾ | @ | .06½ |
| Coated Book | .07½ | @ | .12 |
| Coated Label | .07½ | @ | .10 |
| News—Roll, mill | .03½ | @ | .04¼ |
| News—Sheets, mill | .03¾ | @ | .04¾ |
| No. 1 Manila | .04¼ | @ | .05¾ |
| No. 1 Fibre | .04¾ | @ | .05¾ |
| No. 2 Manila | .04¼ | @ | .04¾ |
| Butcher's Manila | .04 | @ | .04½ |
| No. 1 Kraft | .05¾ | @ | .06¼ |
| Southern Kraft | .04½ | @ | .05 |
| No. 2 Kraft | .05 | @ | .05¼ |
| Wood Tag Boards | .04¼ | @ | .06¼ |
| Sulphite Screenings | .03 | @ | .03¼ |
| Manila Tissue— | | | |
| 24x36 Sheet | .07 | @ | .07¼ |
| White Tissue— | | | |
| 20x30 Sheet | .07¼ | @ | .07½ |
| Boards, per ton— (Delivered Central Territory) | | | |
| Plain Chip | 37.50 | @ | 41.00 |
| Solid News | 47.50 | @ | — |
| Manila Lined Chip | 55.00 | @ | — |
| Container Lined— (Delivered Central Territory) | | | |
| 85 Test | 65.00 | @ | 70.00 |
| 100 Test | 70.00 | @ | — |

### Old Papers

(F. o. b. Chicago)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard White | 2.80 | @ | 2.90 |
| White Env. Cuttings | 3.60 | @ | 3.70 |
| No. 1 Soft Shavings | 2.50 | @ | 2.60 |
| No. 1 Mixed | 1.00 | @ | 1.05 |
| No. 2 Mixed | .90 | @ | 1.00 |
| Ledger & Writings | 1.55 | @ | 1.65 |
| Solid Books | 1.20 | @ | 1.30 |
| Blanks | 1.70 | @ | 1.80 |
| Krafts | 1.90 | @ | 2.00 |
| New Kraft Cuts | 2.25 | @ | 2.35 |
| Manila Envelope Cuttings | 2.00 | @ | 2.10 |
| Ex. No. 1 Manila | 1.55 | @ | 1.65 |
| Print Manila | .90 | @ | 1.00 |
| Folded News (overissue) | .65 | @ | .75 |
| Old Newspapers— | | | |
| No. 1 | .65 | @ | .75 |
| No. 2 | .60 | @ | .65 |
| Mixed Papers— | | | |
| No. 1 | .70 | @ | .80 |
| Roofing Stocks— (F. o. b. Chicago, net cash) | | | |
| No. 1 | 30.00 | @ | — |
| No. 2 | 28.00 | @ | — |

## PHILADELPHIA

### Paper

(F. o. b. Mill)

| | | | |
|---|---|---|---|
| Bonds | .07 | @ | .40 |
| Ledgers | .11 | @ | .40 |
| Writings— | | | |
| Superfine | .13 | @ | .18 |
| Extra fine | — | @ | .22 |
| Fine | .20 | @ | .26½ |
| Fine, No. 2 | .16 | @ | .25 |
| Fine, No. 3 | .12 | @ | .20 |
| Book, M. F. | .06 | @ | .07 |
| Book, S. S. & C. | .06 | @ | .07½ |
| Book, Coated | .11 | @ | .16 |
| Coated Lithograph | .09 | @ | .12 |
| Label | .09 | @ | .12 |
| News | .03¾ | @ | .04 |
| No. 1 Jute Manila | .08½ | @ | .09 |
| Manila Sul., No. 1 | .04½ | @ | .06 |
| Manila, No. 2 | .04 | @ | .04½ |
| No. 2 Kraft | .05¼ | @ | .05½ |
| No. 1 Kraft | .06 | @ | .06¼ |
| Common Bogus | .02¾ | @ | — |
| Straw Board | 60.00 | @ | 65.00 |
| News Board | 47.50 | @ | 50.00 |
| Chip Board | 42.50 | @ | 45.00 |
| Wood Pulp Board | 4.50 | @ | 5.00 |
| (Carload Lots) | | | |
| Binder Boards— | | | |
| No. 1, per ton | 80.00 | @ | 90.00 |
| No. 2, per ton | 75.00 | @ | 80.00 |
| Carload lots | 65.00 | @ | 75.00 |
| Tarred Felts— | | | |
| Regular | 58.00 | @ | 63.00 |
| Slaters (per roll) | 84 | @ | .94 |
| Best Tarred, 1-ply (per roll) | 1.85 | @ | 1.95 |
| Best Tarred, 2-ply (per roll) | 1.44 | @ | 1.54 |
| Best Tarred, 3-ply | 1.93 | @ | 2.08 |
| No. 1 Mixed Paper | .65 | @ | .70 |

### Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White, No. 1 | .11½ | @ | .12 |
| New White, No. 2 | .07 | @ | .07½ |
| Light Silesias | .07 | @ | .07½ |
| Silesias, No. 1 | .07½ | @ | .08 |
| Black Silesia, soft | .05 | @ | .05½ |
| New Unbleached | .10½ | @ | .11 |
| Washable | .04 | @ | .04½ |
| Fancy | .05½ | @ | .06 |
| Cottons—according to grades— | | | |
| Blue Overall | .07¼ | @ | nr |
| New Blue | — | @ | .04 |
| New Black Soft | .05½ | @ | .06 |
| New Light Seconds | .03 | @ | .03½ |
| Khaki Cuttings | .04½ | @ | .05 |
| Corduroy | 03 | @ | .03¾ |
| New Canvas | .08 | @ | .09½ |
| New Black Mixed | .05 | @ | .05½ |

### Bagging

(F. o. b. Phila.)

| | | | |
|---|---|---|---|
| Gunny, No. 1— | | | |
| Foreign | 1.75 | @ | 2.00 |
| Domestic | 1.75 | @ | 2.00 |
| Manila Rope | 3.00 | @ | 3.50 |
| Sisal Rope | 1.50 | @ | — |
| Mixed Rope | 1.10 | @ | 1.25 |
| Scrap Burlaps | 1.40 | @ | 1.50 |
| Wool Tares, heavy | 3.00 | @ | — |
| Mixed Strings | 1.15 | @ | 1.25 |
| No. 1, New Light Burlap | 2.50 | @ | 2.75 |
| New Burlap Cuttings | — | @ | 2.50 |

### Old Papers

(F. o. b. Phila.)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard White | 3.25 | @ | 3.35 |
| No. 2 Hard White | 3.00 | @ | 3.25 |
| No. 1 Soft White | 2.50 | @ | 2.75 |
| No. 2 Soft White | 1.90 | @ | 2.00 |
| No. 1 Mixed | 1.50 | @ | 1.60 |
| No. 2 Mixed | .90 | @ | 1.00 |
| Solid Ledger Stock | 2.00 | @ | 2.10 |
| Writing Paper | 1.90 | @ | 2.00 |
| No. 1 Books, heavy | 1.75 | @ | — |
| No. 2 Books, light | 1.10 | @ | 1.20 |
| No. 1 New Manila | 2.40 | @ | 2.50 |
| No. 1 Old Manila | 1.50 | @ | 1.60 |
| Print Manila | 1.00 | @ | 1.10 |
| Container Manila | .90 | @ | 1.00 |
| Old Kraft | 2.25 | @ | 2.50 |
| Common Paper | .55 | @ | .60 |
| No. 1 Mixed Paper | .60 | @ | .75 |
| Straw Board, Chip | .65 | @ | .75 |
| Binders Board, Chip | .65 | @ | .75 |
| Overissue News | .80 | @ | .90 |
| Old Newspaper | .60 | @ | .65 |

### Domestic Rags (Old)

| | | | |
|---|---|---|---|
| White, No. 1— | | | |
| Repacked | 4.50 | @ | 5.25 |
| Miscellaneous | 3.50 | @ | 4.00 |
| White, No. 2— | | | |
| Repacked | .02½ | @ | .02¾ |
| Miscellaneous | .02 | @ | .02¼ |
| Thirds and Blues— | | | |
| Repacked | 2.50 | @ | 2.75 |
| Miscellaneous | 1.80 | @ | 2.00 |
| Black Stockings | 3.75 | @ | 4.00 |
| Roofing Stock— | | | |
| No. 1 | 1.65 | @ | 1.75 |
| No. 2 | 1.40 | @ | 1.50 |
| No. 3 | 1.25 | @ | — |
| No. 4 | 1.10 | @ | 1.20 |
| No. 5A | .85 | @ | .90 |
| B | .80 | @ | .90 |
| C | .70 | @ | .80 |

## BOSTON

### Paper

(F. o. b. Mill)

| | | | |
|---|---|---|---|
| Ledgers— | | | |
| Sulphite | .07½ | @ | .15 |
| Rag content | .15 | @ | .30 |
| All rag | .38 | @ | .52½ |
| Bonds— | | | |
| Sulphite | .06½ | @ | .11½ |
| Rag content | .15 | @ | .30 |
| All rag | .36½ | @ | .65 |
| Writings | .07 | @ | .20 |
| Superfines | .11 | @ | .31 |
| News | .03½ | @ | .04 |
| Book, Super | .06 | @ | .09 |
| Book, M. F. | .05¾ | @ | .08½ |
| Book, Coated | .08½ | @ | .20 |
| Coated Litho | .09 | @ | .12 |
| Label | .09½ | @ | .15 |
| Jute Manila No. 1 | .11 | @ | .13 |
| Manila, Sul. No. 1 | .04¾ | @ | .06½ |
| Manila, Sul. No. 2 | .03¾ | @ | .04½ |
| No. 1 Kraft | .05½ | @ | .06½ |
| No. 2 Kraft | .04¼ | @ | .05 |
| Common Bogus | .02¾ | @ | .02¾ |
| Delivered New England points | | | |
| Straw Board, rolls .009 | | | 57.50 |
| Straw Board in Sheets, basis 35s to 70s | 54.50 | @ | 55.00 |
| Filled News Board | | | 47.50 |
| Chip Board | | | 45.00 |
| Single Manila Pulp lined board | 55.00 | @ | 60.00 |
| Single White, patent coated board bender | 72.50 | @ | 80.00 |
| Wood Pulp Board | 80.00 | @ | 85.00 |
| Binder Boards | 70.00 | @ | 75.00 |
| (F. o. b. Mill) | | | |
| Tarred Felts— | | | |
| Regular, carload lots | 65.00 | @ | — |

### Old Papers

(F. o. b. Boston)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard White | 2.75 | @ | 3.10 |
| No. 2 Hard White | 2.60 | @ | 2.90 |
| No. 1 Soft White | 2.60 | @ | — |
| No. 1 Mixed | 1.10 | @ | 1.15 |
| No. 2 Mixed | .85 | @ | .90 |
| Solid Ledger Stock | 2.10 | @ | 2.25 |
| No. 1 Books, Heavy | 2.00 | @ | — |
| No. 1 Books, Light | — | @ | 1.15 |
| Manila Env. Cuttings | 2.00 | @ | 2.25 |
| No. 1 Old Manila | 1.20 | @ | 1.25 |
| White Blank News | 1.40 | @ | 1.50 |
| Old Kraft | 1.90 | @ | 2.00 |
| Print Manila | .70 | @ | .80 |
| No. 1 Mixed Paper | .45 | @ | .50 |
| Overissue News | .70 | @ | .80 |
| Old Newspapers | .50 | @ | .60 |
| Box Board, Chip | .65 | @ | — |

### Bagging

(Price f. o. b. Boston)

| | | | |
|---|---|---|---|
| Gunny No. 1— | | | |
| Foreign | 1.80 | @ | — |
| Domestic | 1.55 | @ | 1.60 |
| Manila Rope and Strings— | | | |
| Foreign | 2.65 | @ | 2.80 |
| Domestic | — | @ | 3.00 |
| Mixed Strings | .95 | @ | 1.00 |
| Scrap Burlaps | 1.25 | @ | 1.30 |
| Wool Tares, heavy | 1.35 | @ | 1.50 |
| New Burlap Cutting | — | @ | 2.00 |

### Domestic Rags (New)

(Price f. o. b. Boston)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White No. 1 | .11 | @ | .11½ |
| Silesias, No. 1 | .07 | @ | .07½ |
| New Unbleached | .09½ | @ | .10 |
| Fancy | .05 | @ | .05½ |
| Washable | .04 | @ | .04½ |
| Cottons—According to grades | | | |
| Blue Overalls | .07 | @ | .07½ |
| New Black, soft | .04 | @ | .04½ |
| Khaki Cuttings | .04¼ | @ | .05½ |
| Corduroy | .03 | @ | .03½ |
| New Canvas | .08 | @ | .08½ |

### Domestic Rags (Old)

(Price f. o. b. Boston)

| | | | |
|---|---|---|---|
| Canvas | .04½ | @ | — |
| White No. 1— | | | |
| Repacked | 5.50 | @ | 5.75 |
| Miscellaneous | 5.00 | @ | — |
| White No. 2— | | | |
| Repacked | .04½ | @ | .05 |
| Miscellaneous | .03½ | @ | .04 |
| Thirds and Blues— | | | |
| Repacked | 2.00 | @ | 2.12½ |
| Miscellaneous | 1.75 | @ | 1.90 |
| Roofing Stock— | | | |
| No. 1 | 1.70 | @ | — |
| No. 2 | 1.50 | @ | — |
| No. 3 | 1.10 | @ | — |
| No. 4 | 1.10 | @ | — |

### Foreign Rags

(F. o. b. Boston)

| | | | |
|---|---|---|---|
| Dark Cottons | — | @ | 1.50 |
| New No. 1 Shirt Cuttings | 10.50 | @ | 11.00 |
| Dutch Blues | 2.00 | @ | 2.12½ |
| Lace Curtains | 5.00 | @ | 5.60 |
| New Checks & Blues | 4.50 | @ | 4.65 |
| Old Fustians | 1.90 | @ | — |

## TORONTO

### Paper

(F. o. b. Mill)

| | | | |
|---|---|---|---|
| Bond— | | | |
| No. 1 Sulphite | .12½ | @ | — |
| No. 2 Sulphite | .10¾ | @ | — |
| No. 1 Colored | .13½ | @ | — |
| No. 2 Colored | .11¾ | @ | — |
| Ledgers (sulphite) | — | @ | — |
| Ledgers, No. 1 | .36 | @ | — |
| Ledgers, No. 2 | .27 | @ | — |
| Writing | .09½ | @ | .10 |
| News f. o. b. Mills— | | | |
| Rolls (carloads) | 3.25 | @ | — |
| Sheets (carloads) | 3.75 | @ | — |
| Sheets (2 tons or over) | 4.00 | @ | — |
| Book— | | | |
| No. 1 M. F. (carloads) | 7.75 | @ | — |
| No. 2 M. F. (carloads) | 7.50 | @ | — |
| No. 3 M. F. (carloads) | 7.25 | @ | — |
| No. 1 S. C. (carloads) | 8.25 | @ | — |
| No. 2 S. C. (carloads) | 8.00 | @ | — |
| No. 3 S. C. (carloads) | 7.75 | @ | — |
| No. 1 Coated and Litho | 14.50 | @ | — |
| No. 2 Coated and Litho | 13.50 | @ | — |
| No. 3 Coated and Litho | 12.75 | @ | — |
| Coated tinted | .15 | @ | — |
| Wrapping— | | | |
| Rag Brown | 4.85 | @ | — |
| White Rag | 5.25 | @ | — |
| "B" Manila | 5.65 | @ | — |
| No. 1 Manila | 6.65 | @ | — |
| Fiber | 6.65 | @ | — |
| Kraft, M. F. | 7.20 | @ | — |
| M. G. | 7.35 | @ | — |

### Pulp

(F. o. b. Mill)

| | | | |
|---|---|---|---|
| Ground Wood | 27.00 | @ | 28.00 |
| Sulphite easy bleaching | 60.00 | @ | — |
| Sulphite news grade | 50.00 | @ | 52.50 |
| Sulphite, bleached | 68.00 | @ | 70.00 |
| Sulphate | 65.00 | @ | — |

### Old Waste Paper

(In carload lots, f. o. b. Toronto)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| White Env. Cut | 3.00 | @ | — |
| Soft White Book Shavings | 2.85 | @ | — |
| White Blk, News | 1.50 | @ | — |
| Book and Ledger— | | | |
| Flat Magazine and Book Stock (old) | 1.25 | @ | — |
| Light and Crumpled Book Stock | 1.10 | @ | — |
| Ledgers and Writings | 1.50 | @ | — |
| Solid Ledgers | 1.50 | @ | — |
| Manilas— | | | |
| New Manila Cut | 1.50 | @ | — |
| Printed Manilas | 1.00 | @ | — |
| Kraft | 2.25 | @ | — |
| News and Scrap— | | | |
| Strictly Overissue | .80 | @ | — |
| Strictly Folded | .80 | @ | — |
| No. 1 Mixed Paper | .65 | @ | — |

### Domestic Rags

(Price to mills, f. o. b. Toronto)

| | | | |
|---|---|---|---|
| No. 1 White Shirt Cuttings | .12 | @ | .12½ |
| Fancy Shirt Cuttings | .06 | @ | .06¼ |